the OIL AND GAS JOURNAL

JUNE 23, 1958

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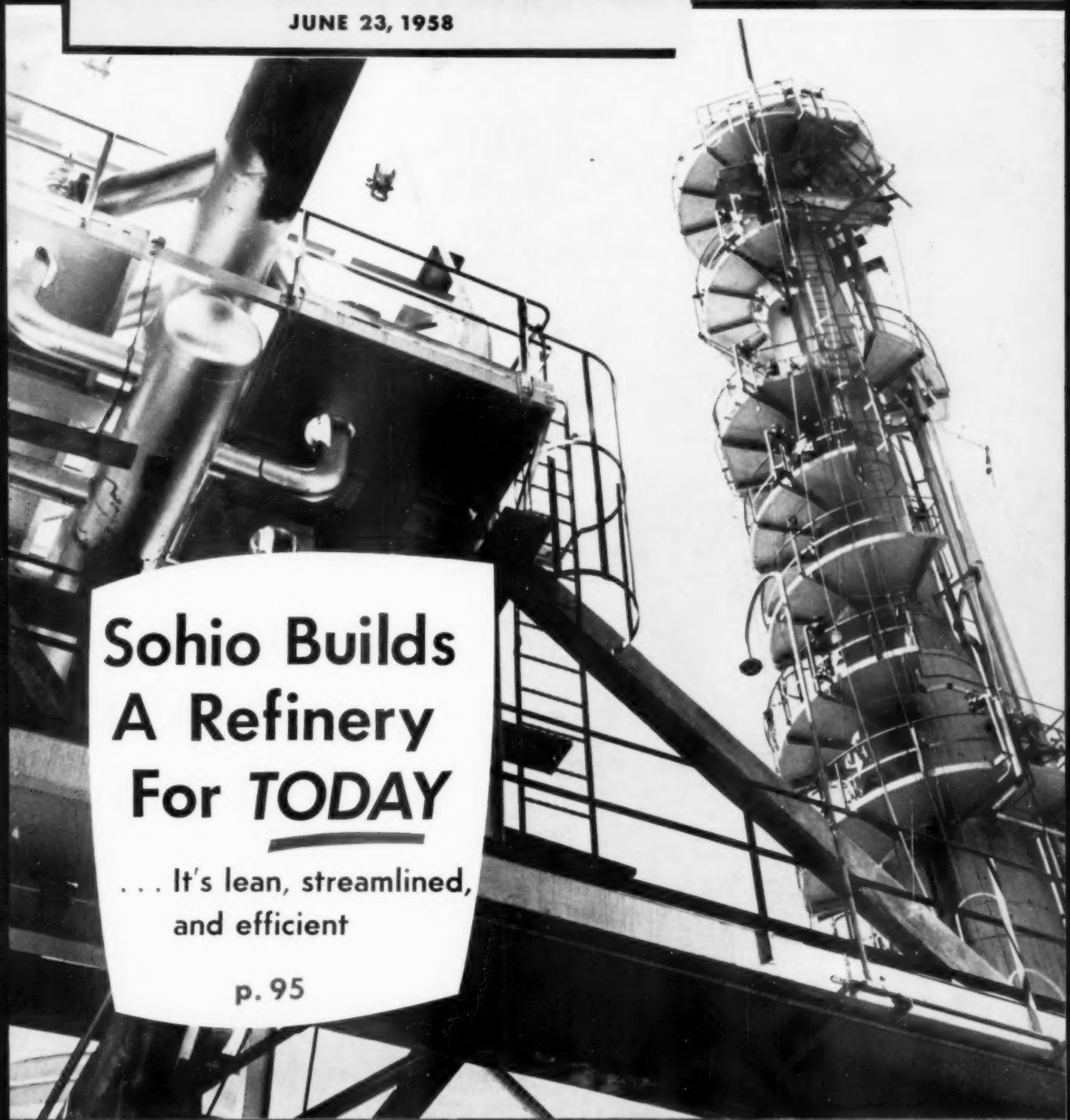

Sohio Builds A Refinery For *TODAY*

. . . It's lean, streamlined, and efficient

p. 95

ONE DOLLAR PER COPY

Running the World's Longest Casing String p. 77

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The OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
June 23, 1958

The oil industry is bracing for a steel price boost:

An increase in the price of steel is termed "definite" for July 1 by suppliers contacted by The Journal. That's the day steelworkers are eligible for a wage hike equal to about 22 cents an hour, counting fringe benefits.

It's a built-in increase—the third installment of pay boosts specified under the current 3-year contract between industry and United Steelworkers Union. Labor isn't expected to make any concessions and forego the pay raises.

So suppliers agree the price of steel will have to go up to meet the additional wage costs.

How much? Estimates range all the way from $5 to $9 a ton. Last year, when industry made a similar wage increase, basic prices went up $6 a ton.

Effect on the oil industry: If the increase is $5—oil men will have to dig down into their pockets for an extra $30 million next year for their steel goods.

That is the absolute minimum, based on use of 6 million tons of steel. Actual cost would be almost twice that when higher labor and material costs were added down the line by mills, fabricators, shops, and in the field.

Also, the extra costs will affect finished products used by oil men, such as trucks, engines, pumps, etc.

The Texas Society of Professional Engineers is agitating for more money for engineering positions.

The society figures minimum salaries should range from $5,200 to $20,000 annually.

Based on the 8-grade NSPE chart of pre-professional and professional positions, the Texas recommendations for minimum annual salaries are: grade I, $5,200; II, $5,800; III, $6,400; IV, $7,600; V, $9,200; VI, $12,000; VII, $15,000; and VIII, $20,000.

Nationalist drum thumpers who want a Venezuelan national oil company might take a closer look at the breakdown of the University of Zulia's 1958 graduating class.

The class included 26 engineering grads—11 construction engineers, 8 hydraulics engineers, 6 road construction engi-

neers, and 1 lone petroleum engineer. The university is the only one in Venezuela offering a degree in petroleum engineering.

The fourth Arbuckle-Cambro-Ordovician oil discovery in the vast northwestern Anadarko basin was tested last week for 400 bbl. of oil in 14 hours on 13/64-in. choke.

It is Sinclair Oil & Gas Co. 1 Holcomb, north of Buffalo in Harper County, Oklahoma. Nearest Arbuckle oil is in Yellowstone field, 35 miles east. The only other Arbuckle oil in the northwestern Anadarko basin is far to the northwest in Scott County, Kansas, and far to the southwest in Gray County, Texas Panhandle.

A sign of a big increase in activity for the rest of the year in the Rocky Mountain region is the total of 141 new locations last week—a new record for 1958. Of these, 47 were wildcats.

Northwest New Mexico reported 47 new locations, accounting for most of the regional gain. There were 34 in Colorado, 24 in Nebraska, and 18 in Wyoming. There were 202 active rotary rigs in the mountain states.

Two indicated discoveries are firing the search for oil in the Cambridge-Las Animas arch country of southwestern Nebraska and northwestern Kansas.

The two new prospects are Skelly's 1 Jankovits in Hitchcock County, Nebraska, 22 miles south of nearest production, and Anderson-Prichard's 1 Litker in Decatur County, Kansas. Both are possible Pennsylvanian strikes.

Deeper drilling might well be worth the gamble in the region of the great curving Balcones fault zone stretching across Central Texas.

There has been some deep drilling on both sides of the fault zone, but not enough to condemn the prospects of the two fairly unexplored belts—termed the two major blind spots in Texas exploration (p. 177).

Denver basin exploration continues its upsurge.

Thirty-six new locations were announced in the northeastern Colorado-southwestern Nebraska basin—11 new wildcats staked in Nebraska, 7 in Colorado.

Largest water flood in the U. S. soon will be claimed by California instead of Texas.

Within 3 months, daily injection of ocean brine into oil pools in the Long Beach Harbor area of Wilmington field will be stepped up from the current 45,000 bbl. to more than 125,000 bbl. Barring legal difficulties, operators expect

to be pumping 500,000 bbl. daily underground before the end of next year.

The increased activity, expected to check land subsidence as well as increase oil recoveries, may prevent or postpone any federal suit. The Navy has asked the Justice Department to start legal action because of subsidence damage to its shipyards.

The world's deepest well, Phillips' 1-EE University in Pecos County, Texas, keeps shattering records.

It now claims:

...Longest casing string ever run—22,919 ft. of 7-in. and 7⅝-in.

...Deepest pipe ever set.

...Longest column of cement ever placed—from casing shoe at 22,919 ft. up to 4,100 ft. in single stage (p. 77).

Oklahoma's deepest hole also is still going down.

At week's end the well, Shell Oil Co. 5 Rumberger, deep Elk City wildcat in Beckham County, was below 20,700 ft. (the old depth record was 20,426 ft. at Magnolia 1 Sterba in Cement field, Caddo County).

A high "batting" average of three discoveries out of five completions has spurred the operations of Reserve Oil and Richfield Oil in California's North Tejon field.

Reserve is drilling on two extension tests in the Butler-Wehr region, scene of the original discovery. Richfield has two tests under way in its area of the field (p. 186).

Four Corners producers supplying Union Oil Co. of California are now getting from 10 to 13 cents a barrel less for lighter crudes.

Union posted a new price list for fields in that area. The 13-cent reduction is for 36-36.9°-gravity oil, from $2.82 to $2.69 a barrel. The 10-cent cut is for crude of 40° and above, from $2.90 to $2.80 a barrel. Cuts in between were 11 or 12 cents a barrel.

Sign of the times:

The inclusion of a hydrogen manufacturing plant in the new 40,000-bbl. refinery Irving Refining, Ltd., will build at St. John, New Brunswick.

Normally catalytic reforming will "make" enough hydrogen to treat intermediate streams and finished products. But Irving's plant will process crudes with low naphthene content, whose dehydrogenation will not make enough hydrogen to desulfurize middle distillates and cycle oil.

Eastern States Petroleum & Chemical Corp. plans to go ahead and build that aromatic alkylation unit (Newsletter,

March 10). It will be the first Alkar unit to be built. The process was developed by Universal Oil Products. It will be a 600-bbl. per day unit, with completion slated by the end of this year.

Pacific Supply Cooperative expects to have plans firmed up in 30 days for its refinery to be built on a 100-acre site at Vancouver. The cooperative has confirmed purchase of the site, without disclosing additional details.

Now there's talk of substituting air or inert gases for petroleum products for lubricating certain bearings.

This isn't a new concept, nor will it put lube oil out of business. Revived interest stems from rising difficulties faced in ultra-modern machines, in digital computers, rocket gyroscopes, radioactive atmospheres, and jet engines. Air, neon, and helium gases were discussed last week at the ASME semiannual meeting in Detroit.

Within 50 years, automotive gas turbines will probably replace gasoline and diesel engines completely, according to a pair of British engineers. They told the ASME that development of the world's first turbine-driven tank, first introduced 4 years ago, partially paved the way.

But much remains to be done to improve efficiency and increase the relative size of the engine. This is the first prediction since engine designers quieted down on the gas turbine 2 or 3 years ago. By contrast with the "10-15" year projections in vogue then, refiners are now given up to a half century to amortize their high-octane processing equipment.

The proposal of Mid-Continent Pipe Lines, Ltd., to build a 30-in. crude line from Edmonton to Chicago won't be heard by the Canadian Board of Transport Commissioners until some time in September. Hearing on a permit was scheduled in Ottawa last week, but was postponed.

East Calgary gas field has been extended another 3 miles—to almost 12 miles in length—by indicated success in both the Mississippian (Elkton) and D1 Devonian zones by a Banff Oil stepout driller in the region. There are now eight gas completions in the field, located east and northeast of the city of Calgary (p. 185).

A pipeline-design problem that staggers the imagination faces engineers on the Feather River project to supply water for southern California.

Estimates point to need for a 22-ft. pipeline or two 15-ft. lines to move 38,400,000 bbl. of water per day at 331 psi. A combination canal-tunnel-aqueduct 740 miles long is planned.

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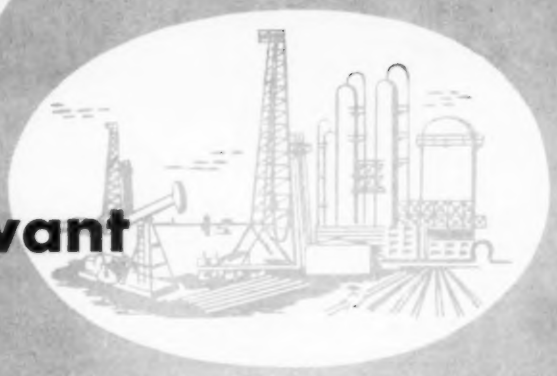
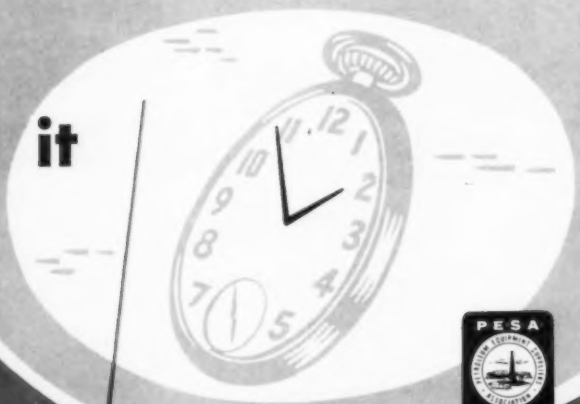


WHERE you want it

WHEN you need it



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SPECIAL SECTION: Sohio's New Toledo Refinery

Design Planning Schedule Met 95

Standard Oil Co of Ohio's planning group decided in 1955 that the company would initiate a major building project. The group then worked out a 6-week schedule to determine location, crudes, product mix, process lineup, selection of processes, degree of integration, and refinery size. The Standard team was augmented by engineers from M. W. Kellogg Co. and the combined group made its decisions on time.

Integrated Design Means Lower Costs per Barrel 99

Studies showed that a refinery of conventional design would cost nearly 25% more than an integrated plant. Thus the project was developed as one process unit.

Designing the Plant Layout 101

Final layout provides for adequate clearance for cranes and other maintenance equipment, more access roads into the units, and an open area in the pump rows.

Dual Gas-Recovery System Is Used 103

The final gas-recovery design provides for two systems, one for saturate gas and one for unsaturate gas.

Gasoline-Blending Facilities Were Tailored 105

The system provides for continuous in-line blending of gasoline base stocks, additives, and TEL.

Models Were Used As Design Tools 107

Control Is Lodged in Nerve Center and Satellites 108

In addition to one central control center for the whole refinery, there are eight satellite boards to control those operations which are best handled locally.

Reformer Features Reactor-Furnace Layout 110

The arrangement is compact and provides for a considerable savings in investment. Reactor inlets and outlets are on at the bottom of the vessels.

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Trailer-Mounted Rig Operates Successfully in California 114

By D. H. Stormont

Brown Drilling Co.'s newest drilling rig has 1,500 hp. available, and will specialize in drilling to depths of 4,000 to 9,000 ft.

New Tool for Fighting Pipe Collapse 118

By B. P. Bayliss

Limited experience with a new-type double-wall liner indicates operators may have a significant new tool for combating pipe collapse and controlling sand.

How La Gloria's Blowdown Systems Work 125

By Larry Resen

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Maracaibo's New Gateway to the Sea 131

Deep-draft supertankers will soon be able to load directly at Shell's new 100-million-dollar terminal on the Lake Maracaibo shore.

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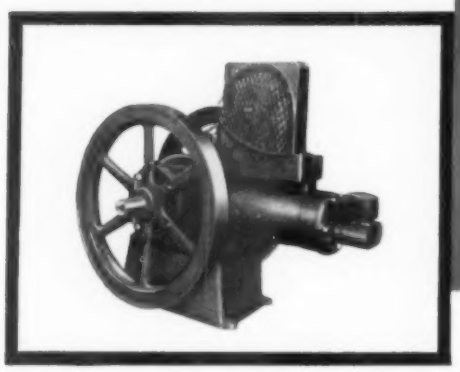

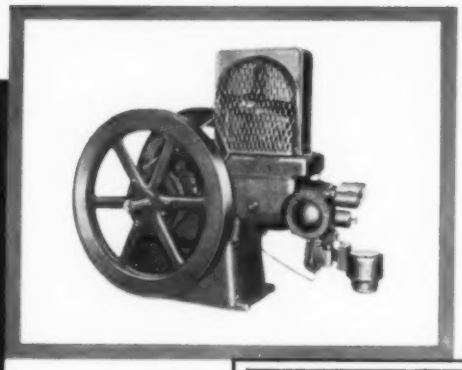

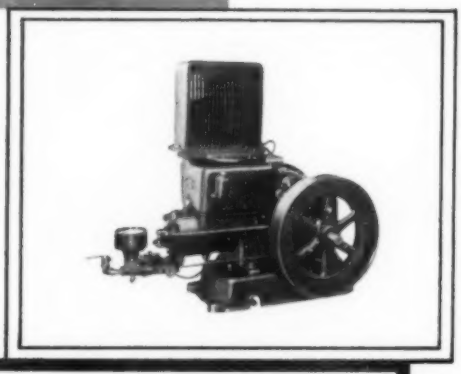

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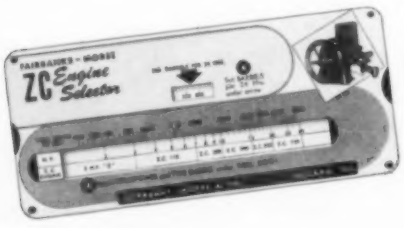

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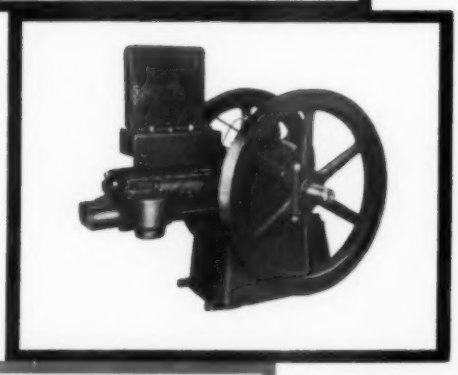

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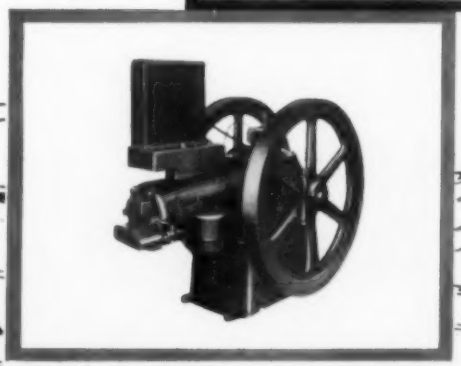

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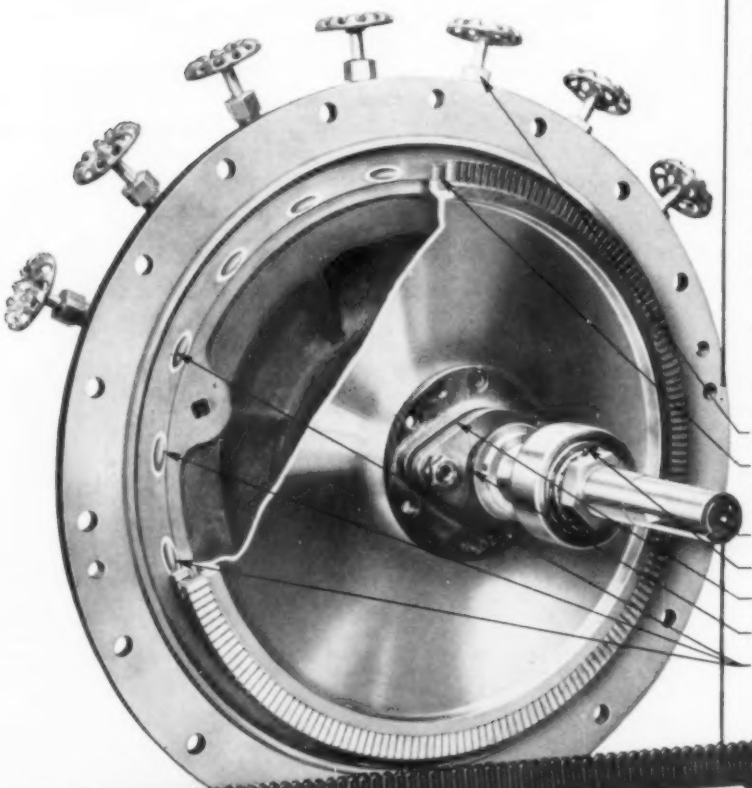

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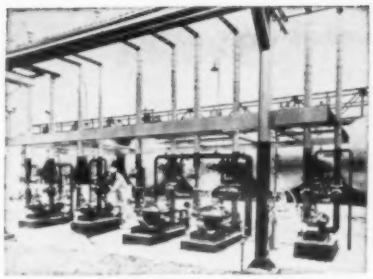

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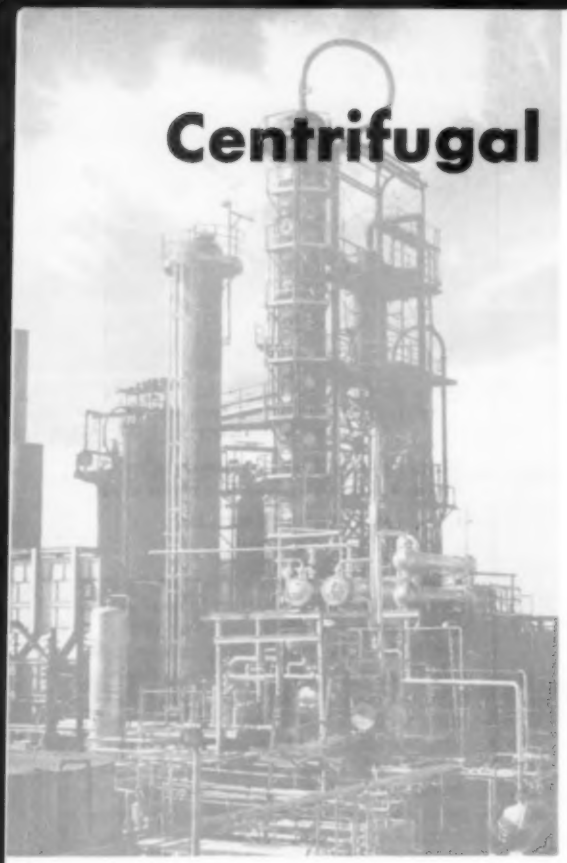

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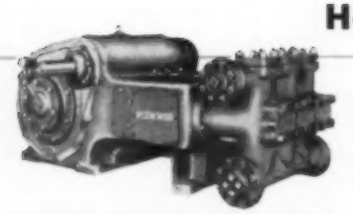

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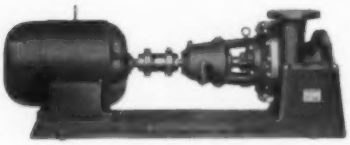
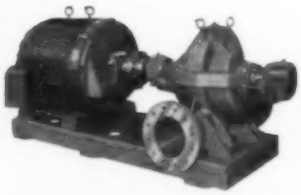
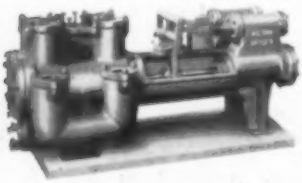


ES CENTRIFUGAL PROCESS PUMPS . . . Single or two-stage heavy-duty type for elevated temperature applications to 900°F., employing vertically split case and single stuffing box for conventional packing or mechanical seal of your choice. End suction, as illustrated, is standard construction—can also be furnished with top suction when preferred. Twenty sizes provide capacities from 15 to 2,000 GPM, 50 to 1100-ft. head, 2 to 250 HP.



DOUBLE SUCTION CENTRIFUGAL PUMPS . . . Single-stage heavy-duty type for temperature applications to 300°F., employing horizontally split case with impeller mounted between bearings. Side suction and side discharge arrangement is standard—bottom suction arrangement is available in 14" and larger sizes. Fourteen sizes provide capacities from 100 to 30,000 GPM, 20 to 300-ft. head, 5 to 1,500 HP.



DUPLEX PISTON-TYPE DIRECT-ACTING STEAM PUMPS . . . Designed for handling a wide range of products for all general service requirements, including the handling of volatile liquids over a wide temperature and pressure range. Available in stroke lengths from 6" to 24" for capacity requirements to 1800 GPM and pressures to 800 psi.

Our long experience qualifies us to design and build pumps to satisfy your most exacting requirements. Ask for catalog containing complete WILSON-SNYDER PUMP *specifications and let us quote on your requirements.*

OIL WELL SUPPLY
DIVISION UNITED STATES STEEL CORPORATION
Executive Offices—**DALLAS, TEXAS**
with Refinery Equipment Specialists at

Braddock, Pa.
Corpus Christi, Texas
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Tulsa, Okla.
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Oil Well Supply Division of USS United States Steel

Graham specializes in these

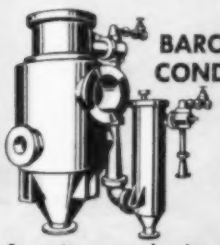
EIGHT FINE PRODUCTS . . .

each item is carefully designed for its intended duty . . . and represents over a quarter of a century's experience

MONOBOLT HEAT EXCHANGERS

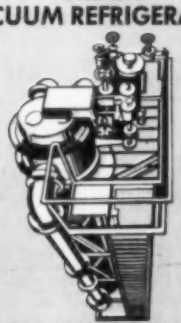
This patented Graham Heat Exchanger permits the inside of the tubes to be available for cleaning in a matter of minutes and further removal of the tube bundle is a cinch. In service and where frequent cleaning is desirable, Monobolt is a sure winner.

BAROMETRIC CONDENSERS



Spray type, non-clogging, built for a wide range of applications and in many materials. The Graham Barometric is flexible, reliable and has been used for hundreds of varied duties.

STEAM VACUUM REFRIGERATION

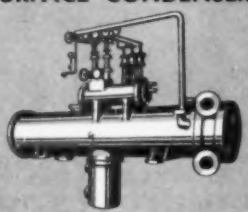


The Graham system is far in advance of all others and will efficiently cool your process water with maintenance practically nil. Hundreds of these units are operating all over the world. Made in all sizes and for virtually every operating condition.

HELIFLOW HEAT EXCHANGERS

The Graham Heliflow is the real modern way of exchanging heat without encountering any of the troubles so typical of the conventional tube and shell unit. The spiral coil gives high rates of heat transfer, close terminal differences, and most economical performance in dollars invested per BTU.

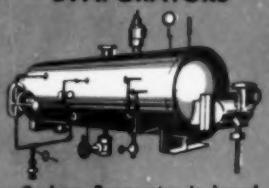
SURFACE CONDENSERS



The Graham Surface Condensers represent the most advanced designs. The Graham patented tube sheet layout assures full distribution of steam and maximum vacuum at the condenser inlet. Coupled with the Graham Steam Jet Ejector, it offers a most efficient package unit.

Graham

EVAPORATORS

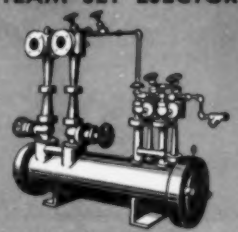


The Graham Evaporator is based on really scientific design—not only the result of many field tests on actual Graham Evaporators but it is based on conclusive accurate tests run in our well equipped laboratory at the factory. They are designed for all concentrations and in a great range of sizes.

DEAERATING HEATERS

The Graham Deaerator is a tried and proven performer. Its efficient construction gives you the maximum area of exposure for heating and deaerating. It will cut corrosion in your evaporater, boiler, piping, etc. It is a very economical unit to purchase.

STEAM JET EJECTORS



The name Graham is synonymous to Steam Jet Ejectors. They are made in any size, for any vacuum and for all applications. Deliveries are assured. Graham Ejectors are noted for their high efficiency.

It will pay you to ask us for a quotation when you are in the market for any of these products

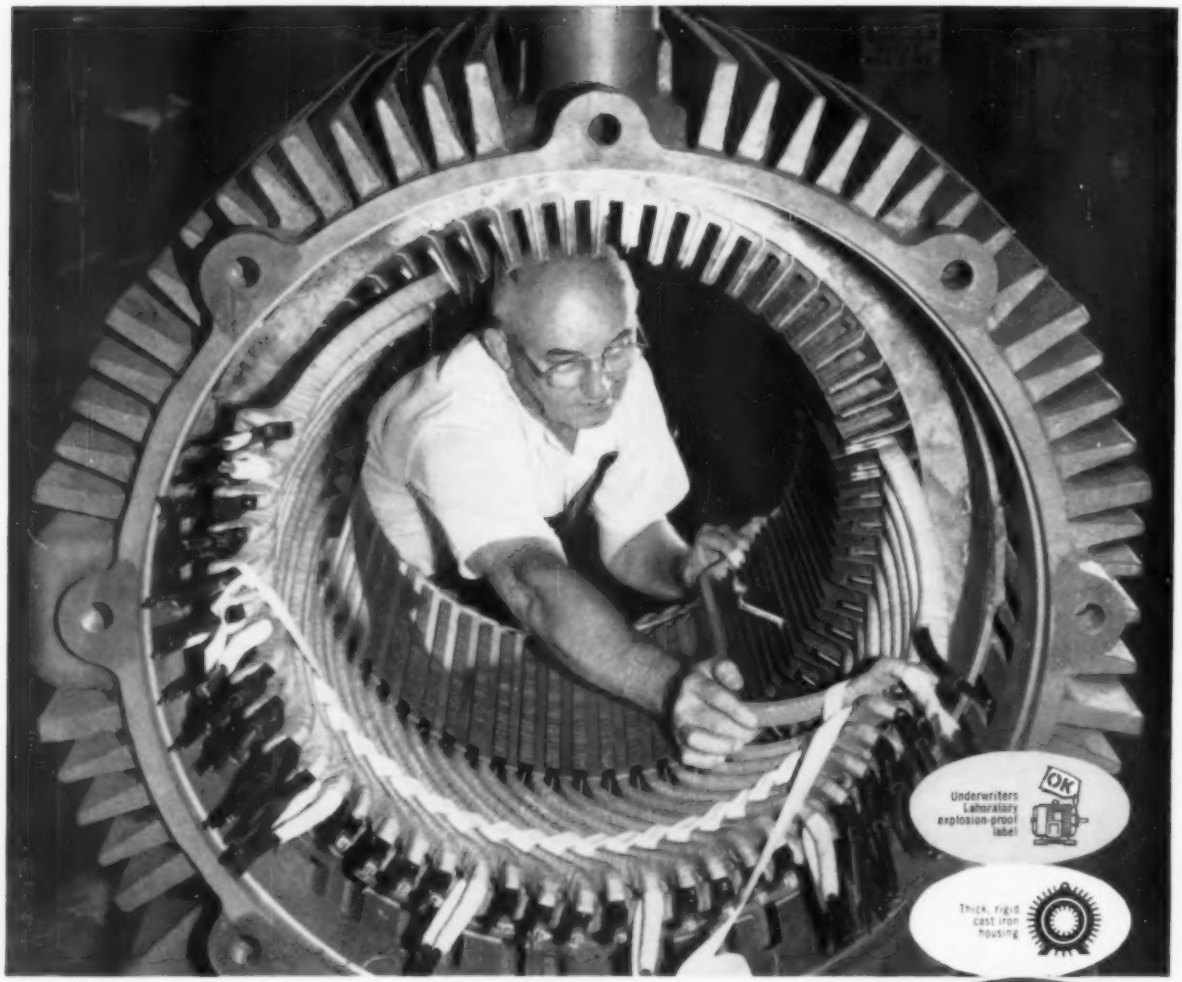
GRAHAM MANUFACTURING CO., INC.

415 LEXINGTON AVE., NEW YORK 17, N. Y.

Offices in principal cities and Canada

Heliflow Corporation

Drop us a postal card and we will mail you additional literature — no obligation



Enclosed and explosion-proof motors... with built-in corrosion resistance

Large Louis Allis motors shrug off abuse... resist corrosion... run for years indoors and outdoors in unattended locations

No job is too tough for these large-frame explosion-proof motors. You can install them in the plant or in remote outdoor locations and virtually forget them. They'll give you long, trouble-free service with a minimum of attention.

Originated by Louis Allis, these dependable motors incorporate the latest design and construction features for safe operation in hazardous and highly corrosive atmospheres. The rugged cast iron housing resists corrosion . . . protects motors from the weather and accidental damage . . . and assures motor alignment for longer life.

Special Louis Allis varnishes insulate motors against heat, moisture, and corrosive gases and liquids. This, plus the heat-dissipating housing surfaces and controlled air flow, keeps motor temperature at a safe operating level. All parts are precision-machined and dynamically balanced for smooth, quiet operation. Rugged split-sleeve bearings are well lubricated and effectively sealed to keep oil in, dirt and water out . . . can be easily replaced when necessary.

Standard ratings for Louis Allis enclosed and explosion-proof motors range up to 700 hp. They're available with electrical and mechanical modifications to meet every need. Ask your Louis Allis District Office for Bulletin No. 1950—or write The Louis Allis Co., 449 East Stewart Street, Milwaukee 1, Wisconsin.

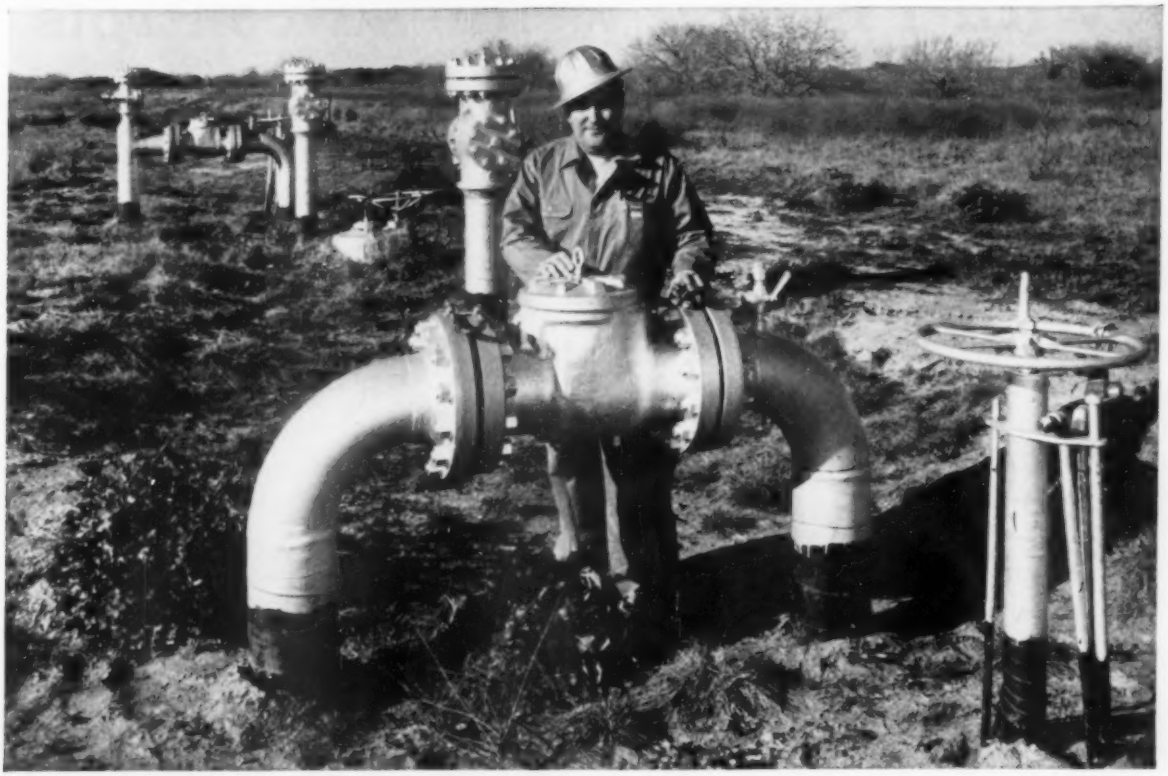
LOUIS ALLIS

LA-538

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Another new development using

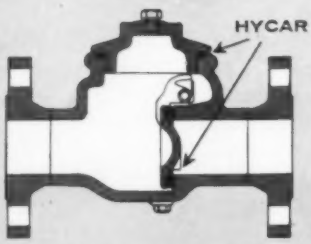
B.F.Goodrich Chemical *raw materials*



HYCAR SEAT FOR CHECK VALVES SEALS SECURELY FROM -60° TO 300°F

SELECTING the proper compound from which to make the "O" rings for this self-sealing Stream-Flo Swing Check Valve proved a problem . . . until Hycar nitrile rubber was tested. It provides effective sealing in intermittent service up to 350°F., in continuous service up to 300°F., with a lower temperature limit of –60°F.

For applications like this, Hycar nitrile rubber is ideal. Its outstanding resilience under a wide range of temperature conditions means that it can withstand repeated and severe mechanical deformation. Since it lives with hydrocarbons that would destroy other types of rubber, it can be used for natural gas, distillate, and sweet and sour crude oil.



Two Hycar "O" rings, one for clapper seal and one for the top cover seal, are used in Stream-Flo Swing Check Valve made by Charles Wheatley Company, Tulsa, Oklahoma. "O" rings are manufactured by F. H. Maloney Co., Houston. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber material only.

Hycar may be the material that will help you get more results in your application. For technical information, write Dept. KC-4, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio.

Hycar

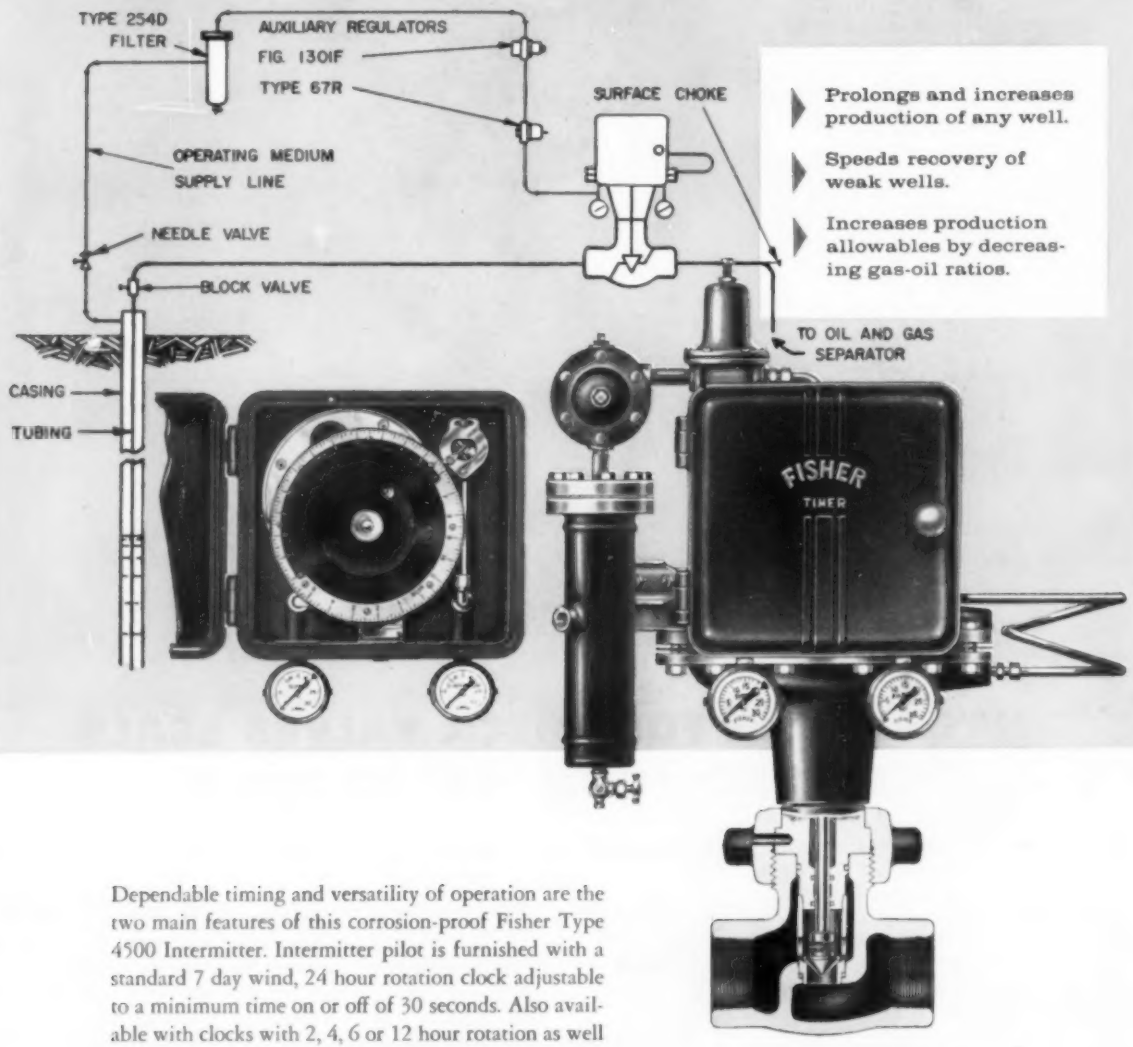
American Rubber

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • Harmon colors

Maximum production efficiency with Fisher's wellhead controls



- Prolongs and increases production of any well.
- Speeds recovery of weak wells.
- Increases production allowables by decreasing gas-oil ratios.

Dependable timing and versatility of operation are the two main features of this corrosion-proof Fisher Type 4500 Intermitter. Intermitter pilot is furnished with a standard 7 day wind, 24 hour rotation clock adjustable to a minimum time on or off of 30 seconds. Also available with clocks with 2, 4, 6 or 12 hour rotation as well as clocks with electric drive. Reverse action can be easily achieved by simply rotating relay cap 180°. Complete information is available on the Fisher Type 4500 Intermitter by requesting Bulletin O-4500.

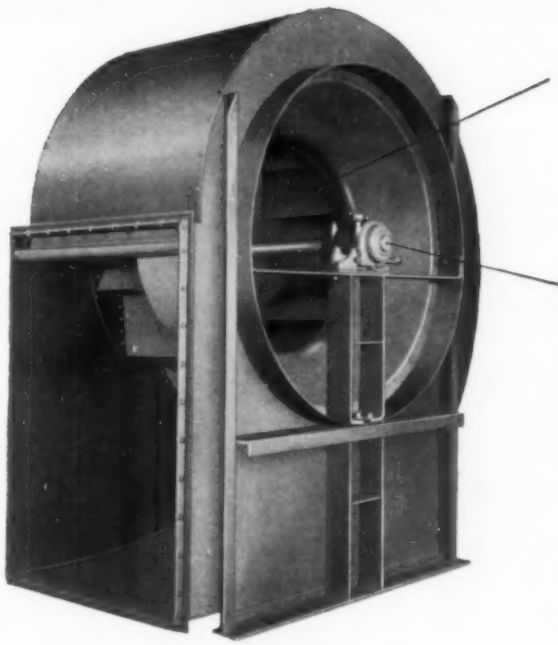
FISHER TYPE 4500 INTERMITTER
Mounted on a Type 125-P Field Valve.

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD . . . CHANCES ARE IT'S CONTROLLED BY

FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / London, England

FISHER® Controls
SINCE 1880



HIGH-EFFICIENCY STREAMLINE WHEEL

Large-area, backwardly inclined blades have true nonoverloading power characteristic. Medium-speed operation with minimum fan size is ideal for either direct connection to motor *or* V-belt drive.

CHOICE OF HEAVY-DUTY BEARINGS

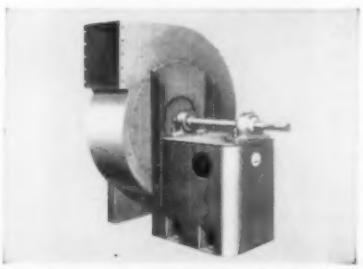
Standard – Heavy-duty, self-aligning ball-bearing pillow blocks.
Optional–Babbitted-sleeve, self-aligning type or roller pillow-block bearings.

American Blower HS Fans hit top efficiency at medium speeds with minimum fan size

Versatile is the word for American Blower fans. For among this complete line of precision-built fans, you'll find an economical solution to *your* air-moving problem – whether it be ventilating, heating, drying or processing. And the heavy-duty construction of every American Blower fan guarantees you many years of low-cost, minimum-maintenance service.

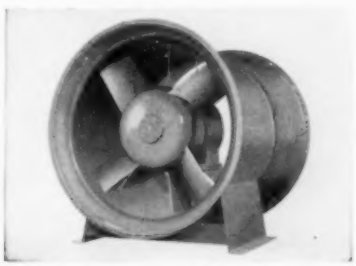
Nationwide, 73 American Blower factory branch offices are ready to serve you. At your request, skilled sales engineers will help select the equipment to handle your air-moving job best within your budget. Call today! American-Standard, American Blower Division, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

It pays to standardize on American Blower fans for every duty!



Industrial Fans – 3 optional wheels handle air, material, long shavings.

Sirocco Fans – low speed, quiet operation; move more air per revolution.



Axial Fans – move high volumes in minimum space; flexible installation.

AMERICAN-Standard
AMERICAN BLOWER DIVISION

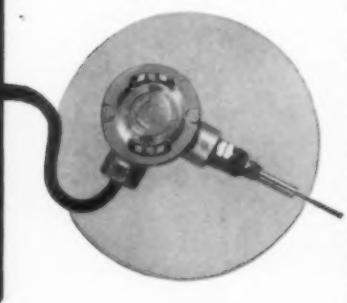
★ Viscosity
★ Specific Gravity

A BETTER WAY TO CONTROL EACH, AUTOMATICALLY AND CONTINUOUSLY

BENDIX ULTRA-VISCOSON*

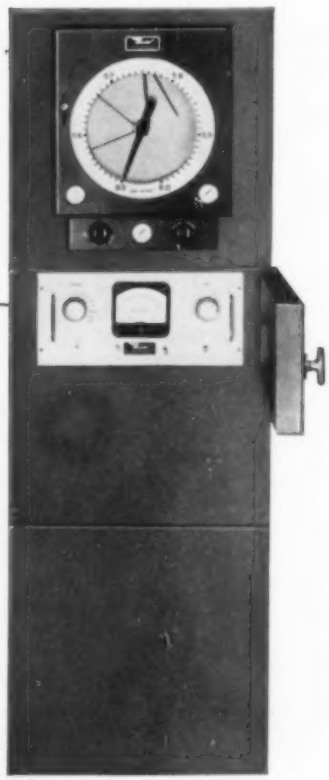
Provides continuous and automatic viscosity control of from one to six individual stations in a single system. Ranges: 0-50,000 centipoises X grams /cc. Proven uses in liquid blending, fuel atomization or refinery applications in the petroleum, chemical, steel, gravure and flexographic printing, resin, adhesives, paint finishing and various other fields. Ultra-Viscoson systems are available to fill most industrial and research requirements.

*REG. U. S. PAT. OFF.



BENDIX NUCLEAR DENSITY GAGE

Provides continuous and automatic control of fluid density in process pipelines. Range: 0.5 Sp. Gr. and up, with adjustable spans. Ideal for use with abrasive, corrosive, viscous and high-pressure processes; sensing element does not contact process material. Applications: Density, specific gravity, liquid concentration, vapor/liquid ratio, liquid level, slurry control and interface detection. Range, span and time constant adjustments from front panel.

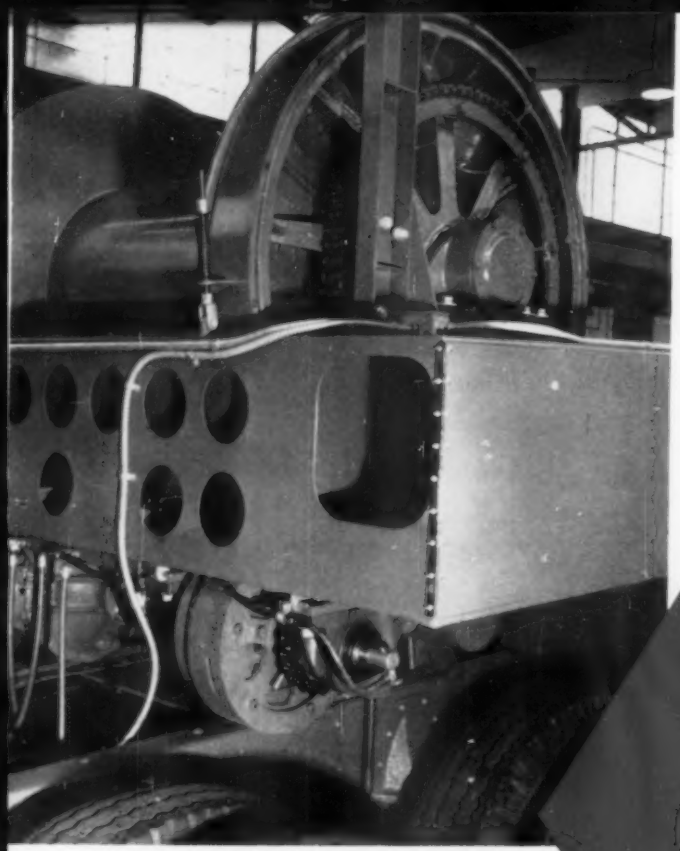


For complete information write
Cincinnati Division, Dept. 350, 3130 Wasson Road, Cincinnati 8, Ohio.

Cincinnati Division

Export Sales: Bendix International Div., 205 E. 42nd St., New York 17, N. Y. Canada: Computing Devices of Canada, Ltd., Box 508, Ottawa 4, Ontario

Bendix
AVIATION CORPORATION



"For our needs a Wichita Clutch means RELIABILITY!"

say the engineers
of
SCHLUMBERGER
Well Surveying Corp.

"Reliability of clutch operation is the greatest benefit to our application. WHY? Because breakdowns during operations in an oil well could cause loss of our instruments and thousands of dollars in drilling rig operating expenses. We have therefore chosen Wichita Clutches for the Winch drive of our units. They have performed well throughout tests and field operations."

When You Need a Clutch . . . or Brake Make Sure it's a Wichita . . . You'll Find it Pays . . .

Wichita Standard Air-Tube Disc Clutch

Contact your nearest Wichita Engineer!

Brehm-Lahner, Inc., Detroit, Michigan
L. H. Fremont, Cincinnati, Ohio
W. G. Kerr Company, Pittsburgh, Pa.
Smith-Keser & Co., Avon, Conn., Philadelphia 44, Pa., and New York, N. Y.
Frank W. Yarline Co., Chicago, Illinois
Larry W. McDowell, Long Beach, California
Andrew T. Lobel, Denver, Colorado
Robert R. King Co., Cleveland, Ohio
Norman Williams, Houston, Texas
Allied Transmission Equipment Co., Kansas City 8, Missouri
Donald E. Harman, Dallas, Texas
C. Arthur Weaver, Richmond, Virginia
Malcolm S. Cone, Memphis, Tennessee
Dominion Power Press Equipment, Ltd., Burlington, Ontario, Canada
R. E. Kunz, Seattle 4, Wash.
W. G. Ballantyne Co., Portland 4, Ore.
Bates Sales Co., St. Louis 1, Mo.

WICHITA Clutch COMPANY, INC.
WICHITA FALLS, TEXAS, U.S.A.

THE PARKERSBURG RIG AND REEL CO.
PARKERSBURG WEST VIRGINIA
MADE IN U.S.A.

QUALITY and PERFORMANCE

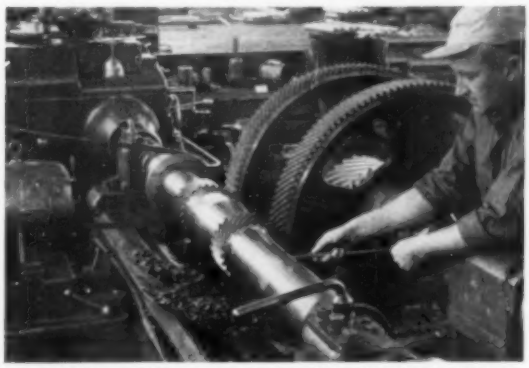
are Engineered and Built into PARKERSBURG Pumping Units

The dependability that makes Parkersburg Pumping Units top choice in the field begins on the drawing board and continues through all manufacturing steps. Here are typical shop scenes showing why you can depend on quality-built Parkersburg Pumping Units with herringbone gear reducers.

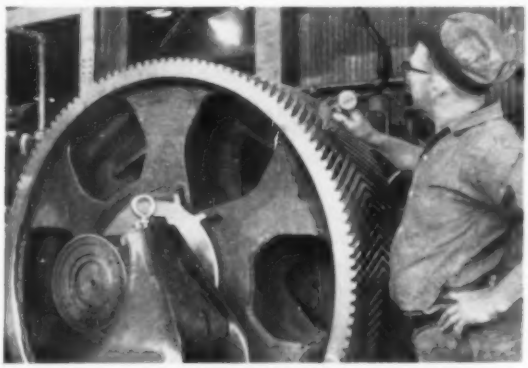
Quality Control from Design to Completed Pumping Unit Makes a PARKERSBURG

YOUR BEST BUY

Inspector checking ground shaft for accuracy. Parkersburg Pumping Units are made to exacting specifications.

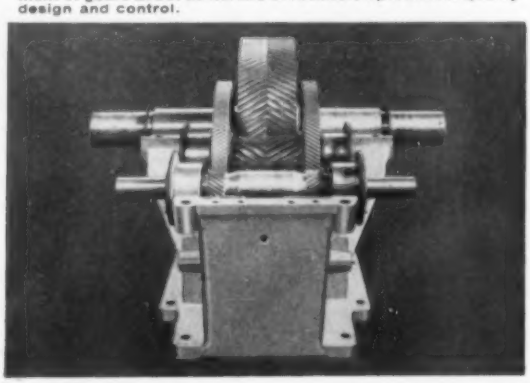


Constant inspections at all stages of construction insure dependability. Inspector here is checking centers on lapping machine.



Checking gear teeth with comparator gauge. This assures proper angle for strength and freedom from undercutting.

Interior of "split case" reducer showing symmetrical arrangement of gears about centerline of reducer, a product of quality design and control.



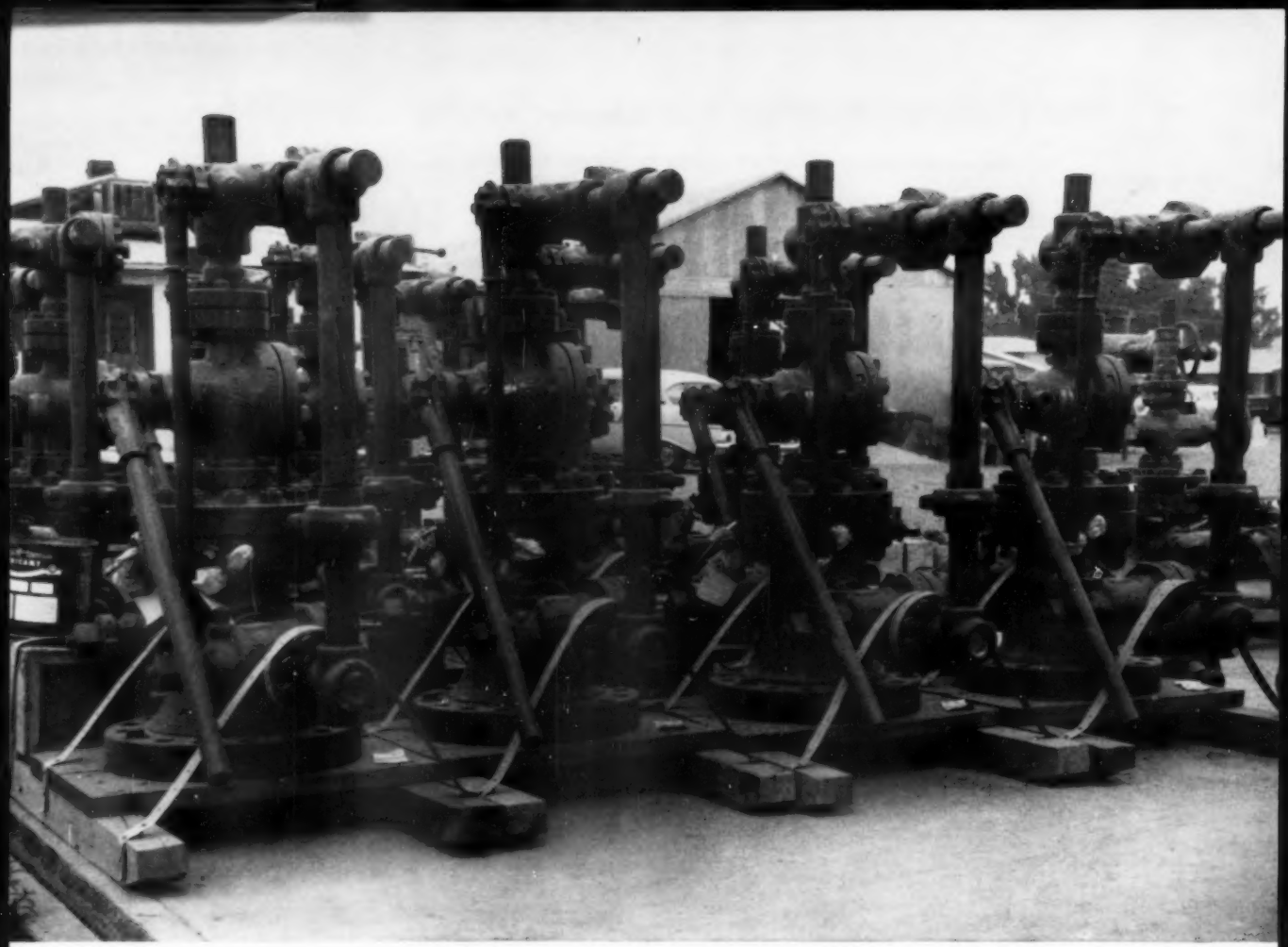
THE
PARKERSBURG
RIG & REEL COMPANY
Division of Parkersburg-Aetna Corp.

PESA

Pumping Unit Division Offices:
710 Mid-Continent Building Tulsa, Oklahoma

Parkersburg Pumping Units are available through the following supply stores:

Beacon Supply Co., Bovaird Supply Co., Canadian Equipment Sales & Service Co., Ltd., C. W. Cotton Supply Co., Franklin Supply Co., Houston Oilfield Material Co., Inc., Industrial Supply Co., Iverson Supply Co., Midland Supply Co., Inc., Mountain Iron and Supply Co., Murray-Brooks, Inc., The Producers Supply & Tool Co., Rodman Supply Co., Superior Iron Works & Supply Co., United Supply & Manufacturing Co., Wilson Supply Co.



Rockwell-Nordstrom Hypreseal valves on 4000-lb prefabricated Christmas Trees. Get better well-head control at lower cost by always specifying Rockwell-Nordstrom from your supply house or tree fabricator.

READY TO GUARD YOUR WELL

Rockwell-Nordstrom valves **are the first thought of most oil patch men when it comes to guarding their production investment. These men expect a lot from the valves they use. Here are some sound reasons, based on 40-years experience, why they specify** Rockwell-Nordstrom valves:

Easy to operate: Even after the valve has been left open for months, lubricant jacks and frees the plug for instant, ¼ turn closure.

Positive shut-off: Under hydraulic pressure, Rockwell-Nordstrom valve lubricant creates a tough, leakproof seal around the valve ports . . . a seal that replaces itself and can't be cut away by high pressures or abrasive fluids.

Long-Life, Low Cost: Since lubricant practically eliminates metal-to-metal wear and the seats are fully protected from the line, you get longer valve life at lowest cost.

Rockwell-Nordstrom valves are available in a complete line of sizes and pressure ratings to meet every Christmas Tree or production valve need. For details, see your nearest supplier or write: Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

ROCKWELL-Nordstrom VALVES

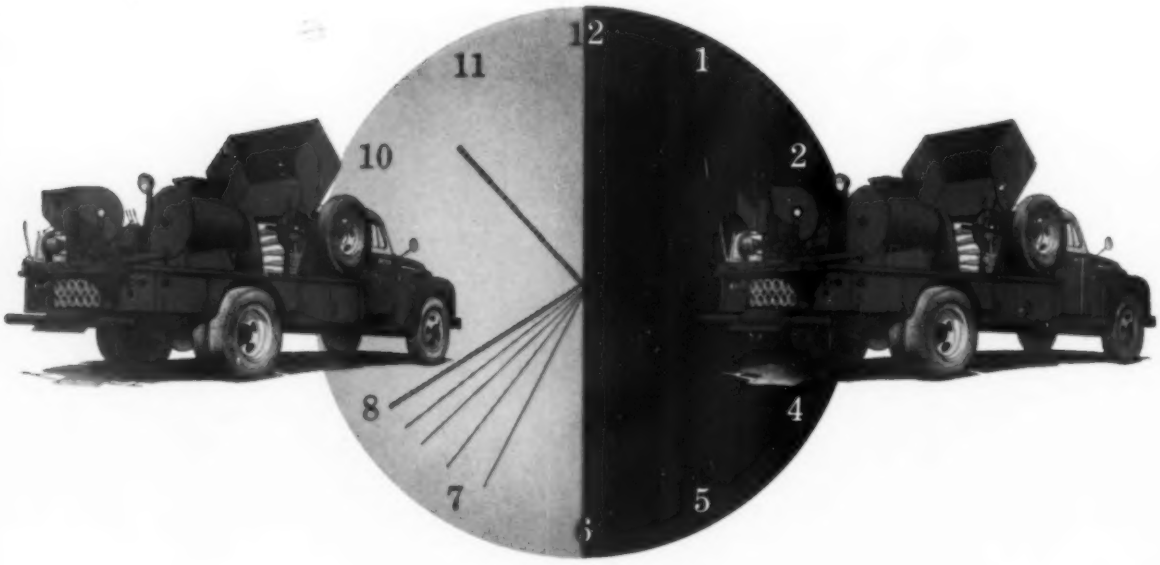
it's ROCKWELL

MANUFACTURING COMPANY

Fast Plugging, Bridging and Repair Service

is as close as your telephone

with **HALLIBURTON DUMP BAILER SERVICE**



Fast remedial service any time of day or night is just a quick phone call away from your well.

For plug back jobs, bridge plugs below damaged pipe, shot tamps, water shutoff, seal for bridge plugs, and many other jobs without cost of running pipe, your telephoned job order will be radioed to the nearest Halliburton Dump Bailer truck... Halliburton-designed and built for this specialized service.

New equipment, including special stuffing box and quick-change head, permits the operator to apply pressure for squeezing materials into the formation with the bailer still in the hole. Small knife-type Bailer bottoms permit Dump Bailer operations inside tubing.

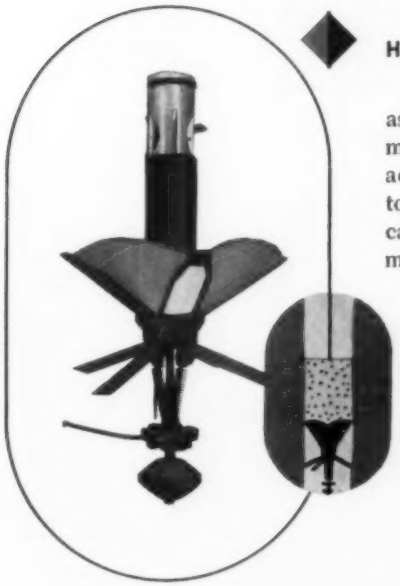
Save hours and dollars on your remedial cementing... call Halliburton Dump Bailer Service whenever the need arises.

HALLIBURTON

OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

Field-Tested Products that make Halliburton Dump Bailer Service Fast, Effective, Economical



Halliburton "DB" Bridging Basket

Forms a dumping bridge for cementitious materials. Widely used as an economical time-saver for bridging to assist in isolating formations, locating and repairing casing leaks, squeezing, perforating, acidizing, plugging to abandon or plug back work. Attached to Bailer section by special adapter, and lowered in open hole or casing. Pickup of Bailer sets and opens Bridging Basket and dumps material simultaneously.

Cal-Seal

A faster-setting gypsum cement ideally suited for temporary plugs. High compressive strength in one hour after setting. Low permeability. Readily drillable. Setting time can be accelerated or retarded to meet special conditions.

Hydromite

Waterproof plastic-base gypsum cement for plugging off bottom hole water in producing wells. Fluid phase sets up after being squeezed into formation to form a tight, permanent, non-permeable seal around the plug which expands in the hole as it sets. Especially effective for shutting off formation fluids or gases when regular cements fail to produce desired results.

Halliburton Limit Plug

Forms bridge in casing to stop or limit the downward movement of well fluids and materials placed by Dump Bailer. Drillable. Designed to resist squeeze pressure from above, up to 2,000 psi. Run in on wire line and set by powerful spring and latch.

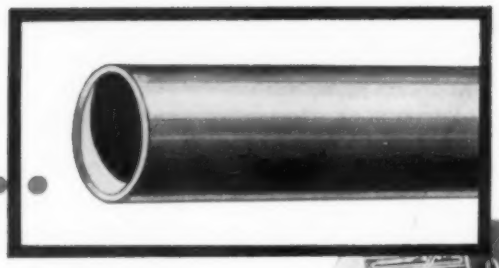
Open

Closed

DUMP BAILER SERVICE

284 SERVICE CENTERS — JUST MINUTES AWAY FROM YOUR WELL

Casing...



Clutches...

Complete Supply

from Mid-Continent where and when you need them....

Complete in-the-field stocks of parts and equipment at your Mid-Continent field store are planned in advance to anticipate the specific supply requirements of your area.

For around-the-clock supply service from thousands of items carried in stock, call your local Mid-Continent representative.

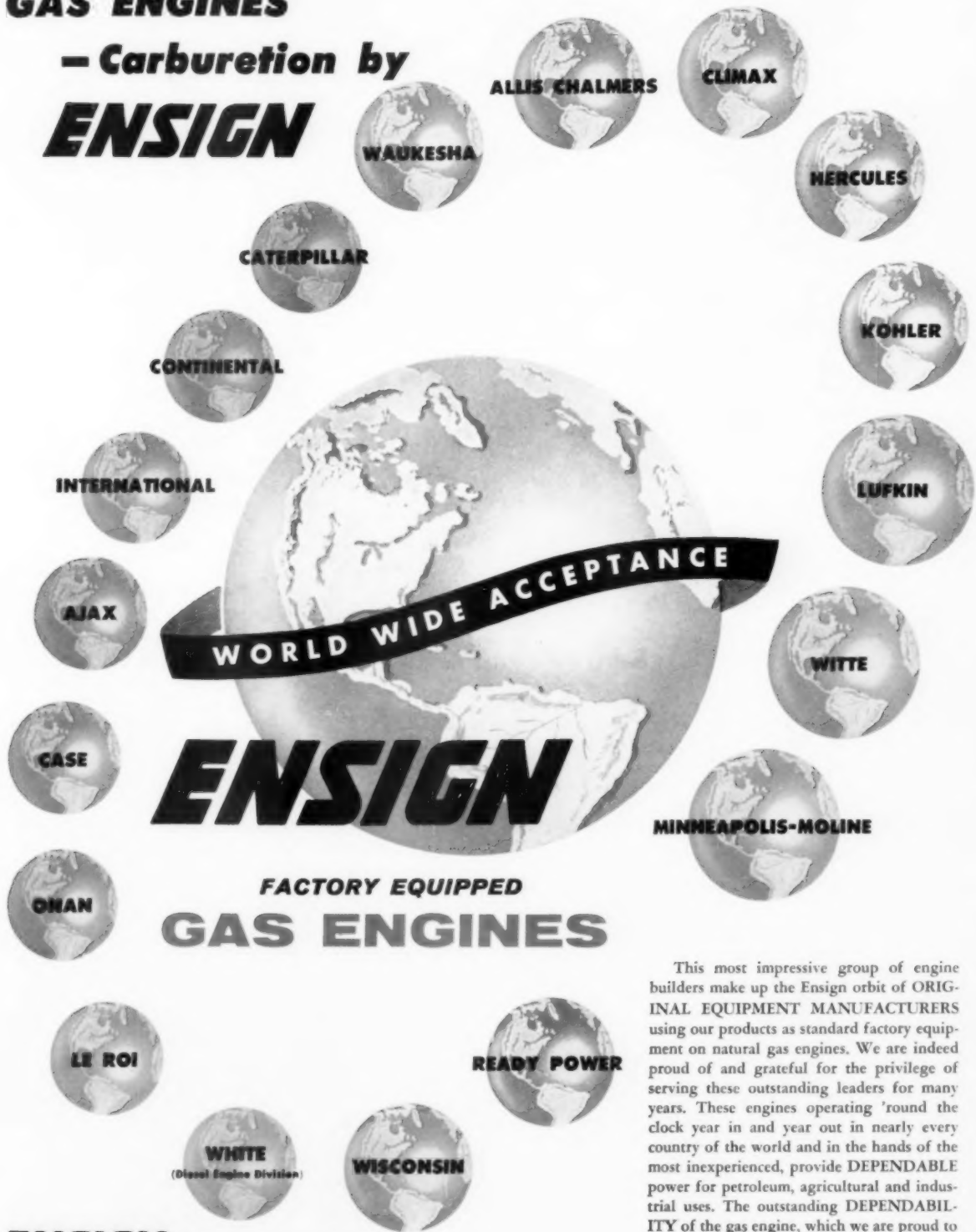
MID-CONTINENT SUPPLY CO.

MID-CONTINENT BUILDING • FORT WORTH, TEXAS

Export Division: 45 Rockefeller Plaza, New York 20, N. Y. Cable: MIDCUMPORT NYK

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

GREATEST NAMES in GAS ENGINES — Carburetion by ENSIGN

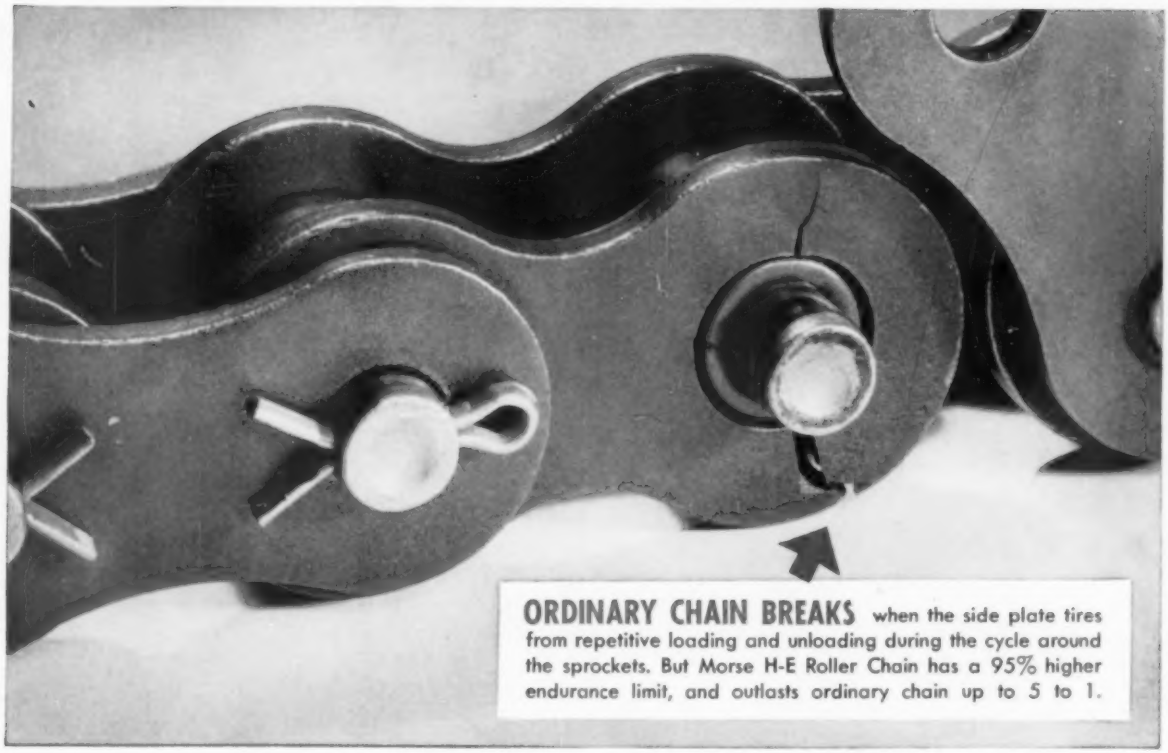


This most impressive group of engine builders make up the Ensign orbit of ORIGINAL EQUIPMENT MANUFACTURERS using our products as standard factory equipment on natural gas engines. We are indeed proud of and grateful for the privilege of serving these outstanding leaders for many years. These engines operating 'round the clock year in and year out in nearly every country of the world and in the hands of the most inexperienced, provide DEPENDABLE power for petroleum, agricultural and industrial uses. The outstanding DEPENDABILITY of the gas engine, which we are proud to share, is a tribute to the engine designer who through many decades has developed to a high degree of proficiency both engine and carburetor techniques.

ENSIGN CARBURETOR COMPANY

1551 E. Orangethorpe, Fullerton, California

Branch Factory: 2330 W. 58th Street, Chicago, Illinois



ORDINARY CHAIN BREAKS when the side plate tires from repetitive loading and unloading during the cycle around the sprockets. But Morse H-E Roller Chain has a 95% higher endurance limit, and outlasts ordinary chain up to 5 to 1.

"Tired Metal"...the bane of chain now licked by MORSE H-E

Morse H-E Roller Chain outlasts ordinary chain by up to 5 to 1 . . . can save you thousands of dollars annually on tough drilling jobs

Deep drilling puts chain under terrific loads and shocks, day after day. Result? Chain metal "tires" —and the chain breaks. The unretouched photograph shows what happens.

But now a special Morse process has licked the "tired metal" problem. Morse High-Endurance Roller Chain takes 95% more punishment than ordinary chain—gives up to 500% longer service life.

This special process means Morse H-E Chain costs up to 10% more. But that's a small price to pay for a chain that can save you thousands of dollars in replacement costs and lost drilling time . . . a chain that keeps delivering the power under the roughest oil field conditions.

For more information on the chain that licked the "tired metal" problem, check your favorite supply store. Or write: MORSE CHAIN COMPANY, Dept. 22-68, Ithaca, N. Y. Warehouses in Houston and Odessa, Tex.; Farmington and Hobbs, N. M. Export: Borg-Warner Intl., Chicago 3, Ill.

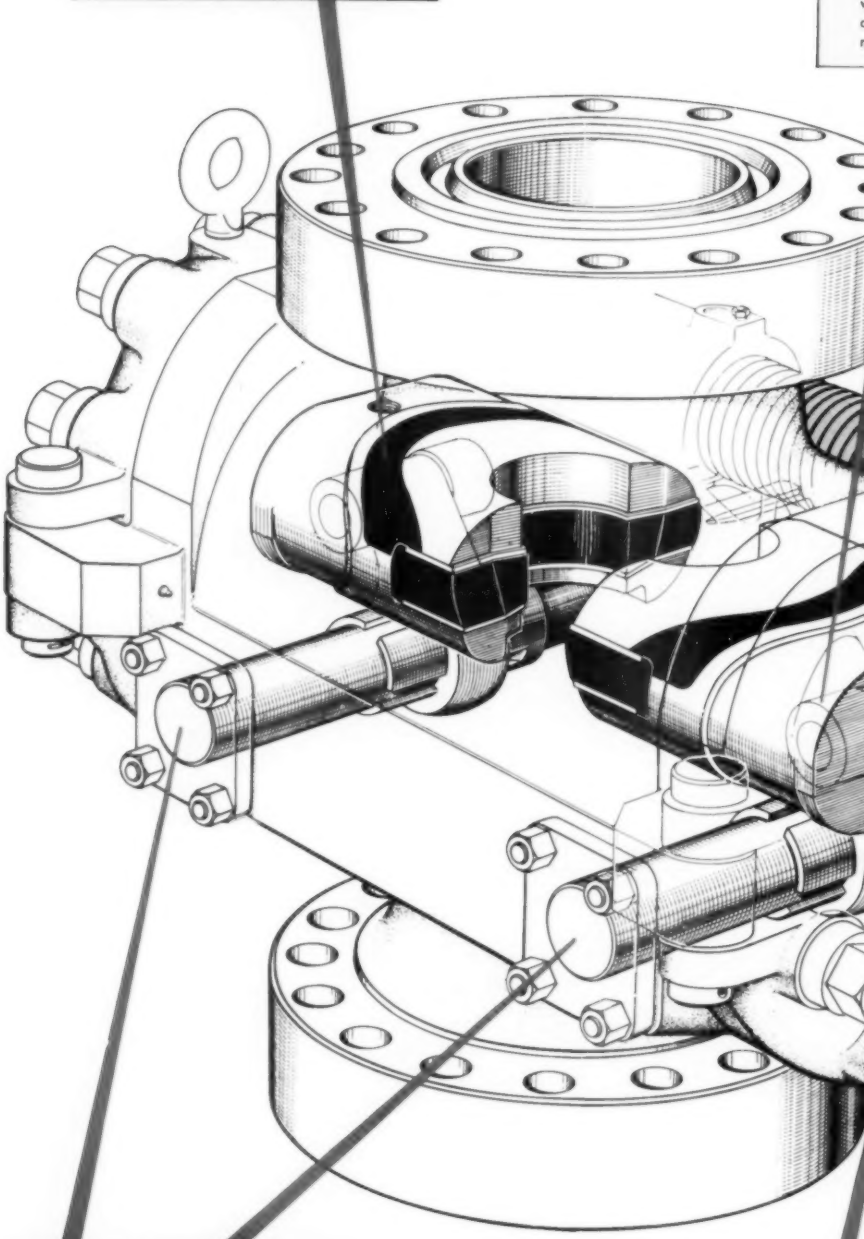
IN POWER TRANSMISSION
THE TOUGH JOBS COME TO

MORSE MORSE BW

*Trademark

REMEMBER: Only Morse offers you all four of these basic drives: Roller Chain, Silent Chain, Hy-Vo®, and "Timing"® Belts.

Ram packing is self-sealing and self-feeding, with a big reserve of tough oil-resistant Hycar rubber. These packing elements are built to take the rough treatment they are bound to get.



Transverse ram shafts are pressure sealed at both ends affording "balanced pressure" operation. Shafts rotate—do not pull abrasives into seals as with sliding rods.

Compact hinged bonnet
access for simplified ra
When fully retracted th
arm assemblies drop
rams. Ram bores are
ward bonnets to ease

Cameron TYPE "F"

BLOWOUT PREVENTER

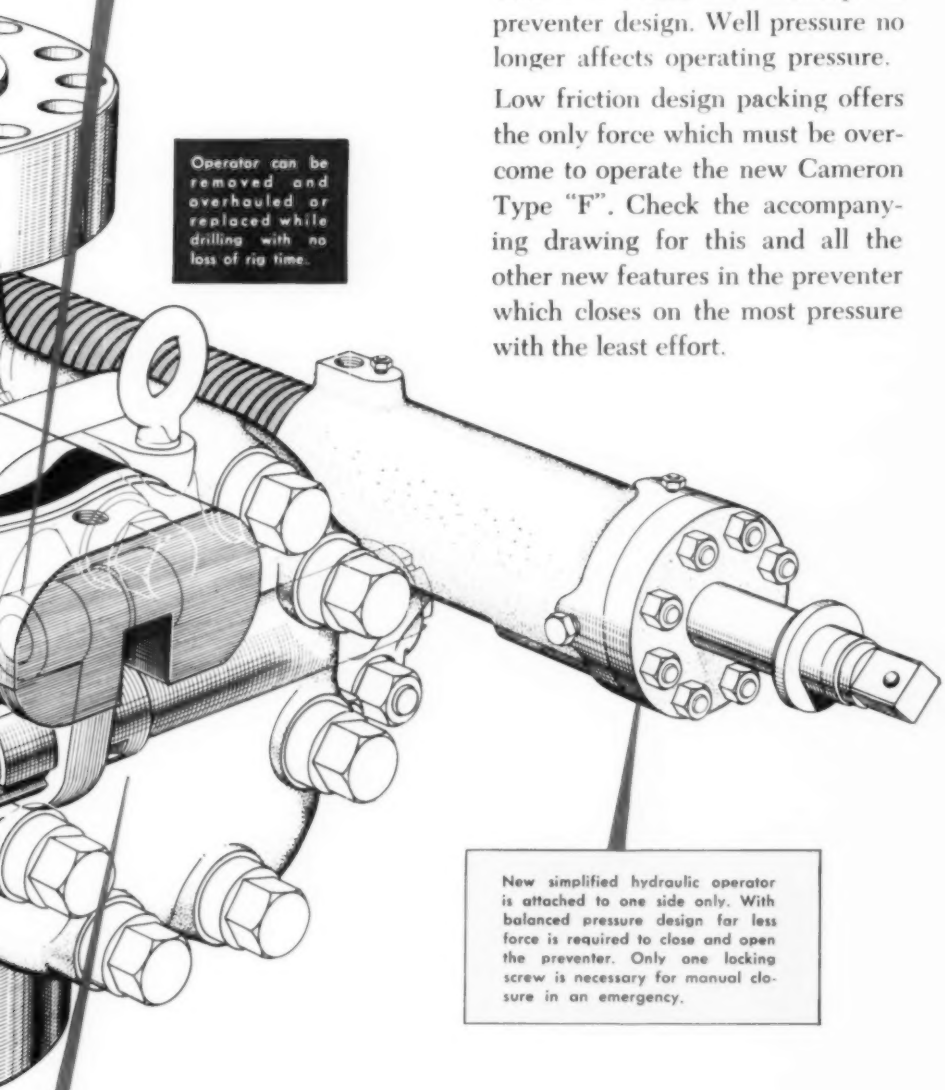
"The Preventer with Pressure Balanced Design"

This is a brand new concept in preventer design. Well pressure no longer affects operating pressure.

Low friction design packing offers the only force which must be overcome to operate the new Cameron Type "F". Check the accompanying drawing for this and all the other new features in the preventer which closes on the most pressure with the least effort.

Arms and rollers operate in Tee slots to close and open rams. Design geometry produces fast movement until rams engage pipe (or each other in blind application), at which point movement speed is reduced and sealing pressure is tremendously increased.

Operator can be removed and overhauled or replaced while drilling with no loss of rig time.



New simplified hydraulic operator is attached to one side only. With balanced pressure design far less force is required to close and open the preventer. Only one locking screw is necessary for manual closure in an emergency.

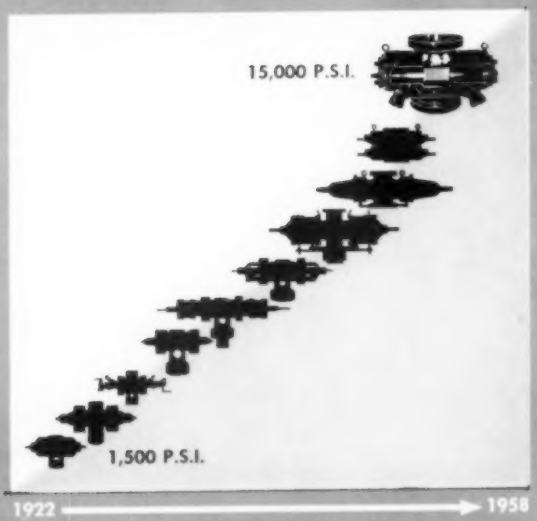
d bonnets allow easy
lified ram changing.
racted the roller and
drop free of the
res are relieved to-
o ease ram removal.

Pressure Ratings through 15,000 psi W.P.

All models are available with side outlets to eliminate drilling spools.

WELLS GO DEEPER

PRESSURES GO HIGHER



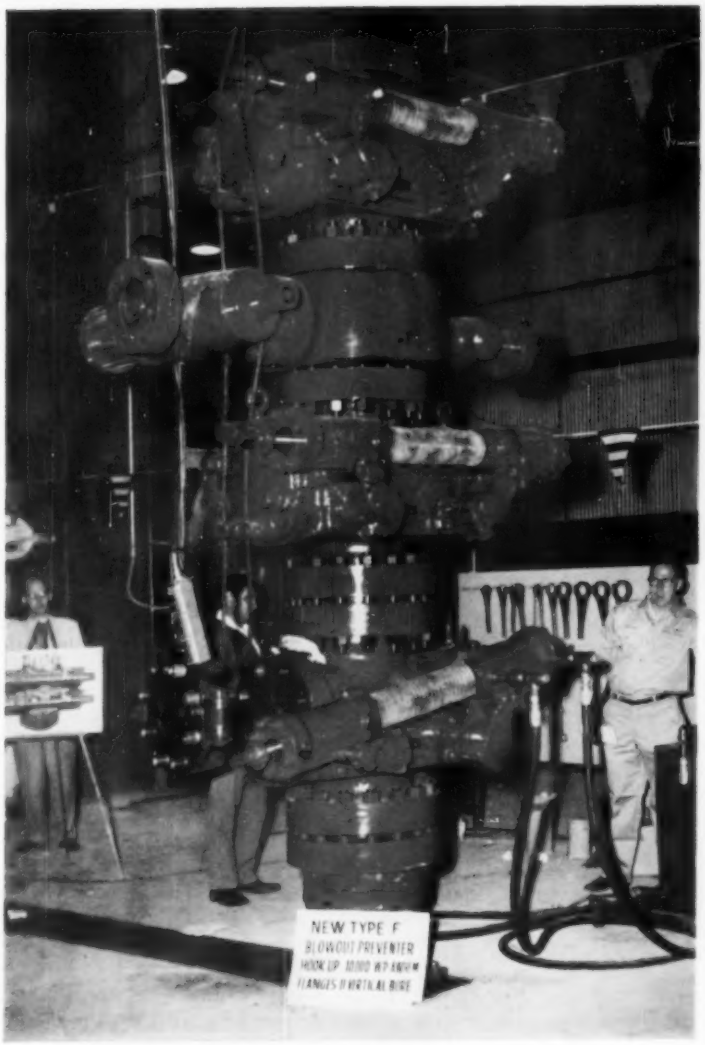
The need for reliable blowout preventers became critical in the early 1920's. Drilling depths had at that time reached gas pressure zones which were increasingly difficult to hold. Available equipment dramatically failed in the field and losses ran high. The first successful blowout preventer, a Cameron design developed during this period, solved the problem and met with instant success. Every Cameron preventer since has anticipated the need for adequate protection and has been ready when higher pressures were encountered. As wells go deeper, pressures increase and equipment to control these pressures becomes a necessity. The Cameron Type "F" Preventer is the latest design in an evolution which has met every new drilling pressure control demand over the years.

Cameron

IRON WORKS, Inc.

P. O. Box 1212 — Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., 76 Grosvenor St., London W. 1 England.



RESEARCH NEVER STOPS

New, high range test facilities had to be built for the Type "F" Preventer research and development. Pressure extremes and flow rates not yet encountered in the field are produced under test conditions.

Directions for design improvement and the soundness of new theories are quickly revealed, making this work one of our most important activities. But fact-finding is, of course, only part of the job. Every phase of design development must be coordinated with manufacturing. Designs must be practical in the shop as well as in the field. Here again our facilities are unique. Cameron manufacturing processes are the most advanced in the industry. For instance, we make our own high quality alloy steel. We forge it on huge presses built to our own specifications. Finally, we machine, assemble and test this equipment with all the careful attention a product deserves when it is the finest of its kind.

Cameron

IRON WORKS, Inc.

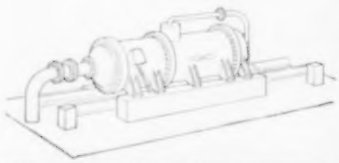
P. O. Box 1212 — Houston, Texas

More than 477,000 horsepower of

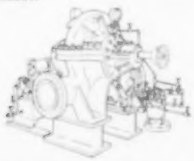
CENTRIFUGAL COMPRESSORS

for NATURAL GAS SERVICE

I-R *"FIRSTS"* in Centrifugal Gas Compressor History



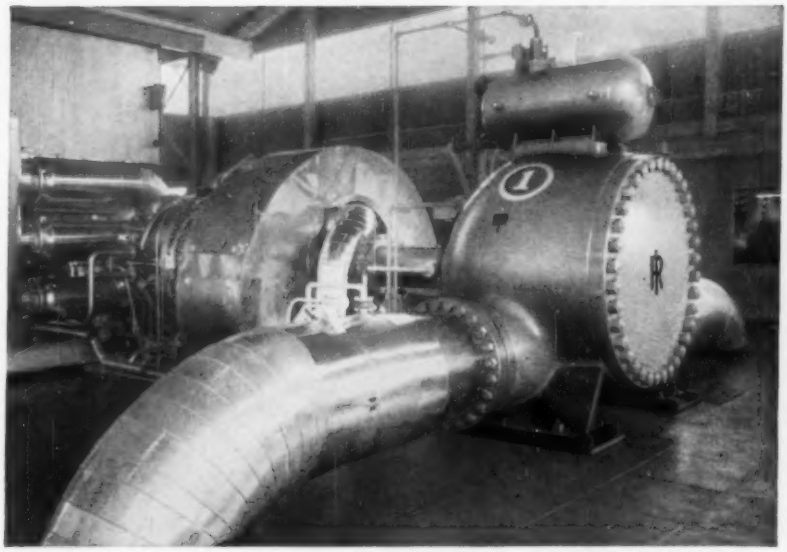
FIRST CENTRIFUGAL PIPE-LINE COMPRESSOR Built by Ingersoll-Rand in 1931, this centrifugal pipe-line booster consists of a six-stage compressor driven by a 3550 rpm, 3000 hp motor, all encased in a pressure vessel.



FIRST COMMERCIAL APPLICATION of centrifugal pipe-line compressors was made in 1947. A total of 78 electric-motor-driven, single-stage I-R centrifugals were installed, to handle approximately 250 mmcfd.

FIRST GAS-TURBINE-DRIVEN UNIT Installed in 1949, this Ingersoll-Rand centrifugal compressor, powered by an 1850 hp simple cycle combustion gas turbine, was the first gas-turbine-driven centrifugal compressor developed and applied to pipeline service, and was designed for a flow of 192 mmcfd at a ratio of 1.18.

FIRST 2000 PSI CENTRIFUGAL GAS COMPRESSOR This Ingersoll-Rand 5000 hp double-case centrifugal compressor was the first unit ever built for handling natural gas at a discharge pressure of 2000 psi.



One of 12 Ingersoll-Rand centrifugal compressors on a large natural gas pipe-line.

This experience means MAXIMUM DEPENDABILITY in modern pipe-line service

FROM the very first pipe-line installation, Ingersoll-Rand has pioneered in the development of centrifugal gas compressors for higher and higher capacities and pressures. And every step of the way, dependability of performance has been a prime consideration in every detail of design and construction. This is why more I-R Centrifugal Compressors have been sold for natural gas service than any other make . . . . a total exceeding 477,000 hp for this service alone.

Backed by such long and successful experience, the modern I-R centrifugal gas compressor is your best assurance of trouble-free performance and long-range economy in gas transmission service.

Ingersoll-Rand

12-736 11 Broadway, New York 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO-BLOWERS • CONDENSERS
CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

NOW!

A BRAND-NEW CONCEPT IN FLOW TOTALIZING!

. . . THE NEW FOXBORO PNEUMATIC FLYBALL INTEGRATOR

Inherently Accurate!

- Eliminates Inaccurate "Spot Check" Counting! Continuous integration assures highest precision.
- Eliminates Cam and Linkage Errors! Unique design balances differential pressure signal directly against centrifugal force.
- Eliminates Calculations! Automatically extracts square root — shows totals in desired units.
- Eliminates Fire and Explosion Hazards! Simple, all-pneumatic operation requires no electric motors, wires, or contacts.

FOXBORO
REG. U.S. PAT. OFF.

Now you can integrate the flow of all process fluids or plant services *continuously* . . . with new accuracy . . . complete safety! The unique new, all-pneumatic Foxboro Flyball Integrator completely eliminates intermittent counting and fire hazard. Its simple, force-balance operation utilizes the 3-15 psi air signal from any differential-pressure flow transmitter. This signal is *continuously* balanced against the "flyball" force of the instrument's pneumatically-driven turbine. The square root function is automatically extracted . . . you read flow totals *directly*.

The Flyball Integrator mounts at the point of measurement or on a panel hundreds of feet away. Response and accuracy are completely unaffected by ambient temperature changes or pressure changes in turbine air supply. Ideal solution to all plant fluids accounting and in-process inventory checking. Write for complete details. The Foxboro Company, 606 Neponset Ave., Foxboro, Mass.

FIRST IN FLOW

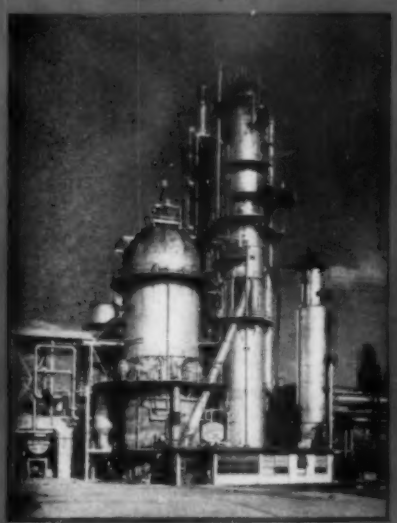
HAMMOND

STORAGE TANKS and PLATE FABRICATION

BIGLIFT* tank with super-spray diaphragm

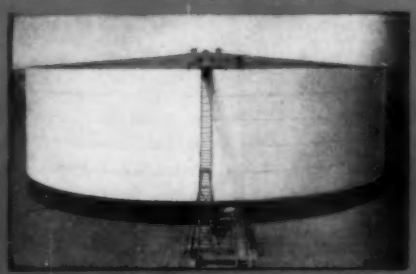
Hammond Spheres

Hammond **TUBESEAL*** and **SPRINGTITE*** Floating Roof Tanks



Process Vessels—Steel • Stainless • Alloys • Cladmetals

Water Storage Tanks



Cone Roof Tanks

The universal acceptance of Hammond-built equipment is the result of more than half a century of experience in the design, fabrication and erection of storage tanks, process vessels and steel plate construction for the petroleum, chemical and allied industries, and for water supply.

HAMMOND IRON WORKS

WARREN and BRISTOL, PA. • PROVO, UTAH • CASPER, WYO. • BIRMINGHAM, ALA.

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*patented

HAMONDTANK

I'M GLAD THIS RIG HAS WECO IRON!

. Good "Iron" can make the difference between profit and loss on a drilling contract. Crewmen like to work with equipment that is safe and able to "take it" without special handling. Operators and owners are happy to add up the savings in time and money that come from using quality "iron."

WECO Unions are good "iron." Full-circle metal-to-metal contact sealing of WECO's ball and cone seats holds the highest pressures under all conditions of surge and vibration. Tough, strong nuts and subs forged or cast from high grade steel give long service, even under the hard usage of today's competitive drilling programs. WECO Unions available in sizes 1" through 12", in pressures from 1,000 through 15,000 psi.

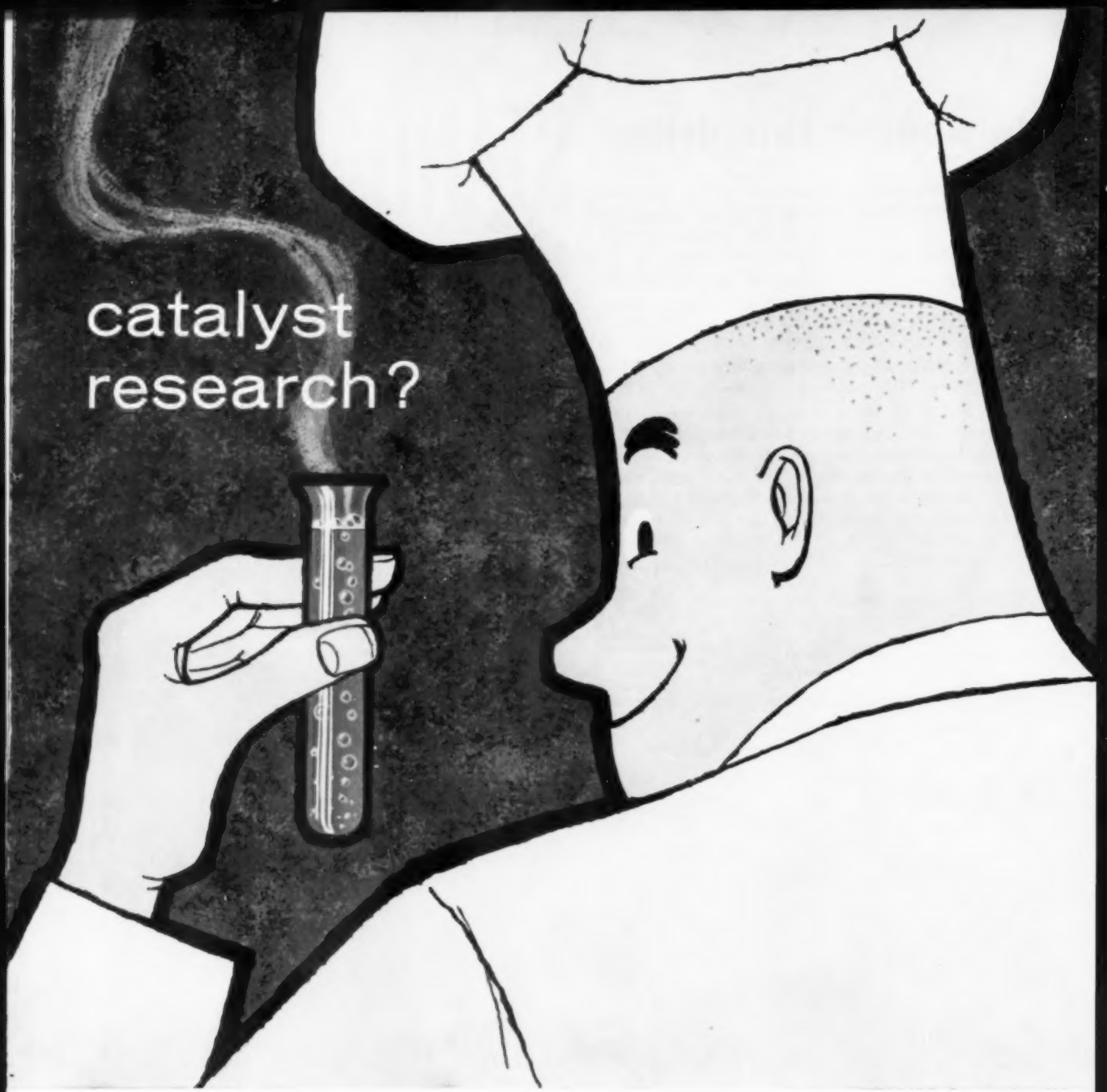
Sold by Supply Stores Everywhere.

U-4-58

WECO®

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of*
FOOD MACHINERY AND CHEMICAL CORPORATION



Right now at Davison, we're cooking up some new catalysts to help you

Our cooks? Catalyst chemists and engineers with broad experience in research, testing and manufacturing. Our kitchen? The brand-new, superbly-equipped Grace Research Center at Clarksville, Md. Our menu? New and improved petroleum refining catalysts. Our recommendation? Look to Davison for new catalysts to help you. Look to Davison year-in, year-out.

DAVISON
CHEMICAL COMPANY
Division of W. R. Grace & Co.
Baltimore 3, Maryland

Buy DAVISON—the quality catalyst backed up by experience, research, technical assistance, service!

No wonder this driller

STANDARDIZES ON "JIMMY" DIESELS!

"Prompt service and parts when needed—that's what has sold us on GM Diesels through the years," says Lee Killingsworth of Jackson Oil Company, Longview, Texas, who now operate four GM Diesel-powered rigs.

"We have to have an oil-field engine with an appetite for heavy work loads and a high degree of portability," he adds. *"The 'Jimmy' Diesel is our choice on both counts!"* The rig shown here drilled 15 wells between August and December, 1957, with no downtime for repairs—moved on the average of three times a month.

This is typical of the trouble-free performance, with lowest-cost upkeep, you get with GM Diesel power. And because these rugged engines are 2-cycle, they pack more power in smaller space with less weight, which makes them far easier to move. Your nearby GM Diesel distributor will gladly explain why a GM Diesel costs *less* to buy—*less* to run—*less* to maintain. How about calling him today?

DETROIT DIESEL ENGINE DIVISION OF
GENERAL MOTORS, DETROIT 28, MICHIGAN

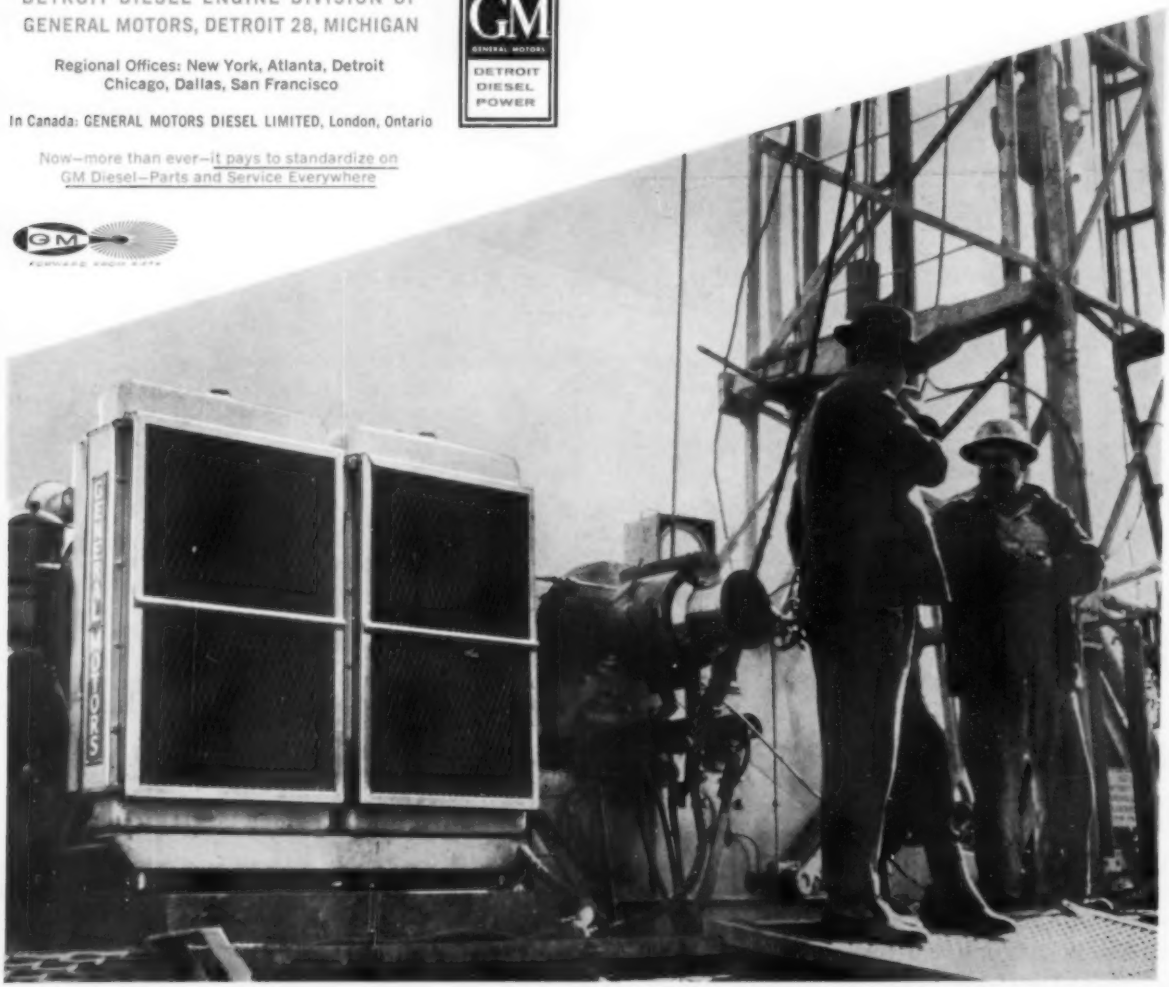
Regional Offices: New York, Atlanta, Detroit
Chicago, Dallas, San Francisco

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

GM
GENERAL MOTORS
DETROIT DIESEL POWER

Now—more than ever—it pays to standardize on GM Diesel—Parts and Service Everywhere

GM
POWERED FOR THE WORLD



GM Twin "4-71" drives Spencer-Harris draw works. Twin "6-71" drives 7¼" x 16" Gardner-Denver mud pump—has been in steady service over two years without downtime.

GONE ARE
remote control worries!

Lenkurt Type 51B Carrier is specially engineered for reliable, low-cost control of unmanned distant stations!

Long distances between headquarters and remote, unmanned stations are no longer a cause for concern.

Now up to 80 supervising and alarm functions—*plus* up to 90 control and operating functions—can be handled *over one voice circuit* with Lenkurt's 51B Supervision and Control system.

Here's how it works: A "changed" condition at a remote point automatically "dials" a reporting lamp and alarm buzzer at control center and then disconnects—leaving the circuit free for other signals. Control operator then dials a 2-digit number to correct conditions at remote station. The circuit is again released after the corrective function is started.

Every time a changed condition is reported, a scanning operation automatically checks all other supervised functions and reports changes to control center. This check may also be initiated at the control.

Using Lenkurt Carrier, Automatic Electric engineers can quickly and economically multiply the capacity of your present equipment — open wire, cable or microwave — to meet your need for remote control, telemetering, dial signaling, supervision or alarm functions. Write today—or call our nearest office for full details.

Automatic Electric Sales Corporation
Northlake, Illinois

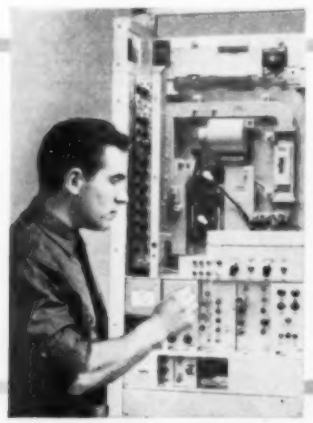
Please send booklet describing new Lenkurt Microtel *Radio System and 51B Supervision and Control System.*

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....



New LENKURT Microtel Type 74A

Latest achievement in high-quality microwave transmission, this new Lenkurt Type 74A system answers all point-to-point communications requirements. Operating in the high-frequency industrial band (Operational Fixed) from 6575 to 6875 megacycles, it is clean in design, reliable and highly flexible. With Lenkurt 45BX Carrier, a single terminal can accommodate from 4 to 240 channels over the one antenna system.

AUTOMATIC ELECTRIC

Subsidiary of **GENERAL TELEPHONE**

survey of 94 installations reveals multiple benefits of

PETRECO ELECTRIC DESALTING

this is what PETRECO DESALTING can do for YOUR refinery

TOPPING UNIT BENEFITS:

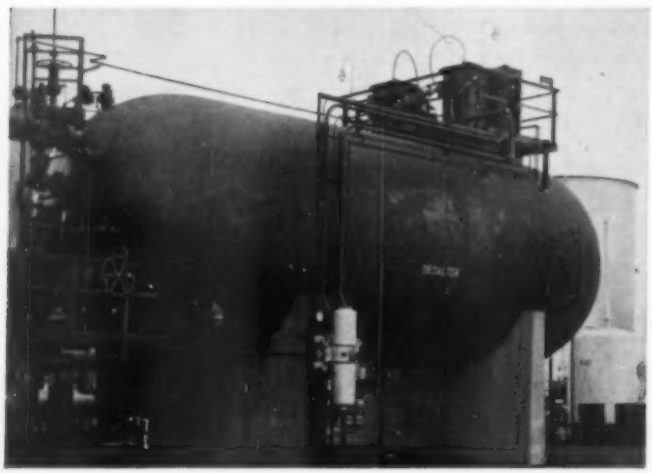
1. Higher charge rates
2. Longer runs
3. Increased service factor
4. Less corrosion in topping unit
5. Higher temperature to tower
6. Less heat exchanger plugging
7. Less crude furnace plugging
8. Scheduled Shutdowns
9. Improved charge stocks for catalytic cracking

CRACKING UNIT BENEFITS:

1. Longer runs
2. Fewer tube replacements
3. Higher temperatures from furnace
4. Less reduced crude furnace coking
5. Scheduled Shutdowns

GENERAL BENEFITS:

1. Higher octane values on gasoline
2. Reduced ammonia consumption
3. Improved kerosine color
4. Cleaner fuel oil
5. Less ash in coke
6. Improved fractionation in tower
7. Disposal of slop oil by blending with desalter charge
8. Disposal of tank bottoms in same way
9. Emergency water trap during tank switches, insuring uniform charge to crude unit
10. On-schedule operation of refinery, more efficient use of personnel



not mere opinion . . . but OPERATING FACTS

These listed benefits are not mere manufacturer's opinions. They are the careful tabulation of pencil-and-pad information obtained by personal interviews out in the field—with refinery operating personnel who actually work with Petreco Electric Desalters every day. Specific operating data were also gathered as substantial proof of these installation advantages.

If you'd like to see these operation facts, and find out more about the PETRECO DESALTING PROCESS, write for illustrated bulletin.

PETRECO

A DIVISION OF PETROLITE CORPORATION

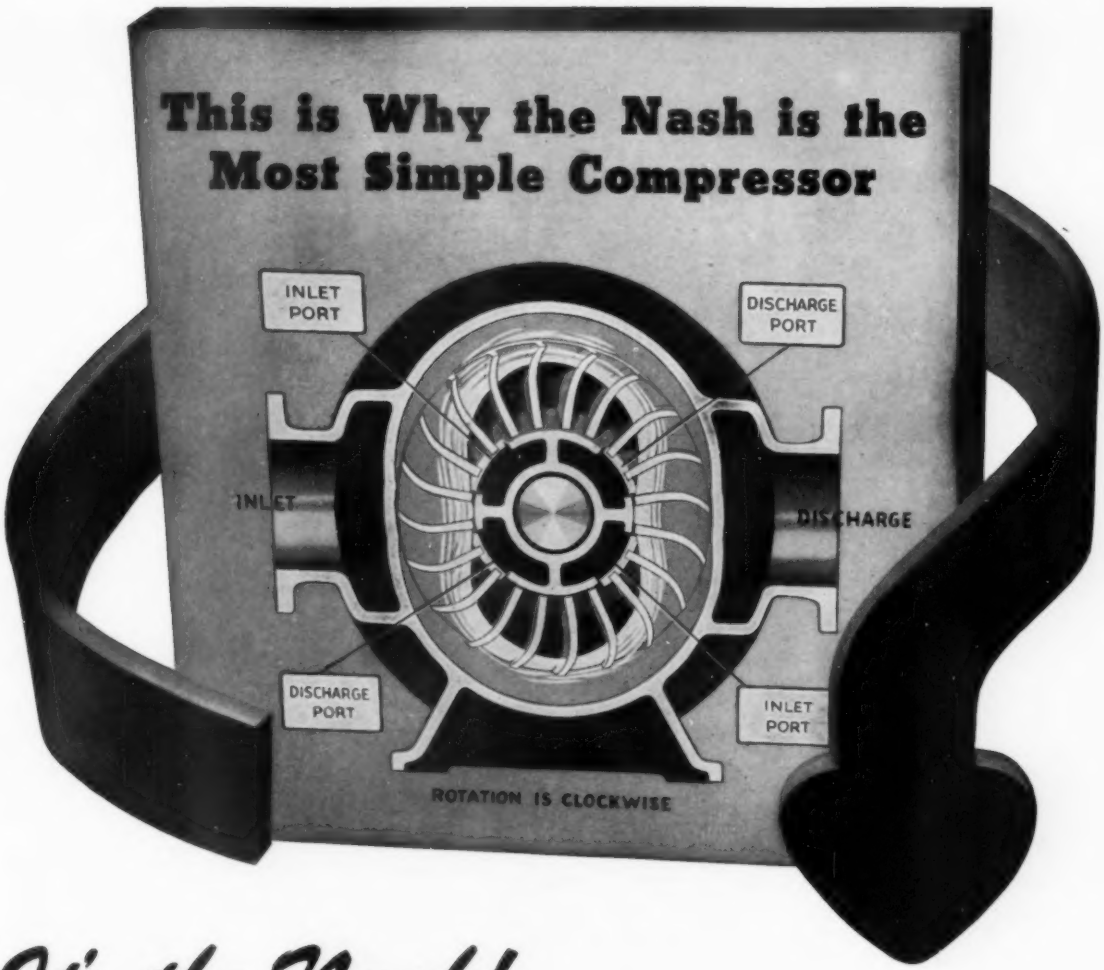
DS-57-1

3202 S. Wayside Drive, Houston 1, Texas • 1390 East Burnett St., Long Beach 7, California

Specialized Electric Petroleum Treating

DESALTING • DEHYDRATING • CAUSTIC WASHING • ACID TREATING • DOCTOR TREATING • SWEETENING • NAPHTHENIC ACID REMOVAL • SEDIMENT REMOVAL

This is Why the Nash is the Most Simple Compressor



It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

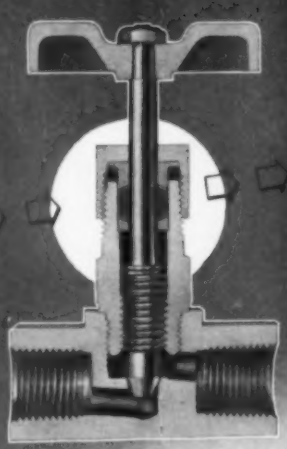
Desired delivery temperature automatically maintained.

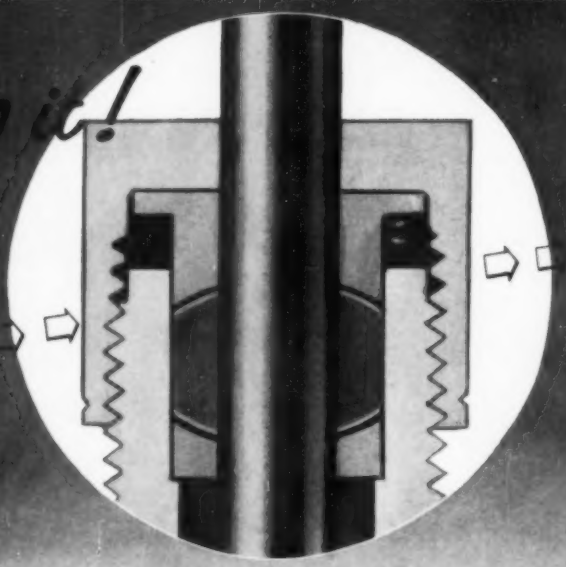
Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

Marsh has it!





Available in

MARSH

416 Stainless Steel

Needle Throttling Valves

- Body and stem guide machined from bar stainless steel stock
- Valve Stem hardened stainless
- Fine stem threads for extra strength and precision throttling
- Deeper inlet and outlet chambers
- Bodies made in accordance with MSS regulations
- Packing "Marpak" system incorporating "Teflon" as described opposite

The Marpak Packing System

—*now with fabulous*

"TEFLON" PACKING

An outstanding feature of the Marsh Needle Valve has been the Marpak Packing System. This unique method of obtaining a tight, but non-binding seal is one of the important reasons for the ability of Marsh Valves to give precision regulation at any pressure up to 10,000 psi.

Now the Marpak system has been made still better by the use of today's miracle material—"Teflon." You probably know of the almost incredible toughness, resilience and non-adhesive properties of Teflon—properties that are unimpaired by the most powerful of solvents, acids, or alkalies, even at temperatures up to 500° F.! As a result of incorporating "Teflon" packing, Marsh Stainless Steel Needle Valves are now

Guaranteed for any pressure up to 10,000 psi at any temperature up to 500° F.

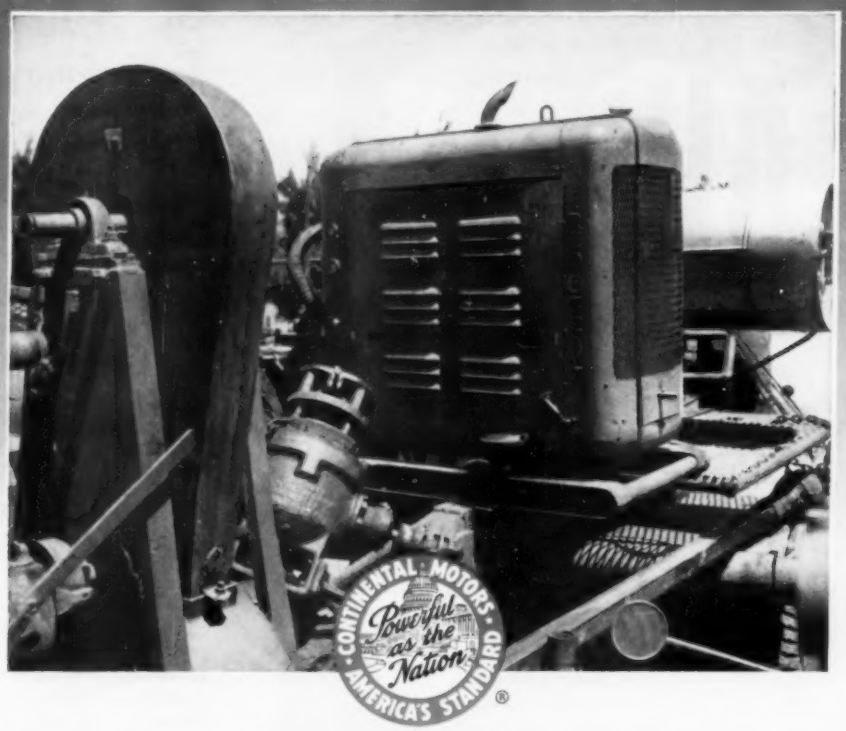
In other makes of valves permissable temperature *decreases* as pressure *increases*—but not with Marsh.

Teflon packing is one more addition to the list of features that are combined only in Marsh Stainless Steel Needle Throttling Valves. Note the list opposite...ask for bulletin.

MARSH INSTRUMENT CO. *Sales Affiliate of Jas. P. Marsh Corp.*, **Dept. [redacted] Skokie, Ill.**
Marsh Instrument and Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta
Houston Branch Plant: 1121 Rothwell St., Sect. 15, Houston, Texas

MORE AND MORE OIL FIELD JOBS DEPEND ON

CONTINENTAL RED SEAL POWER



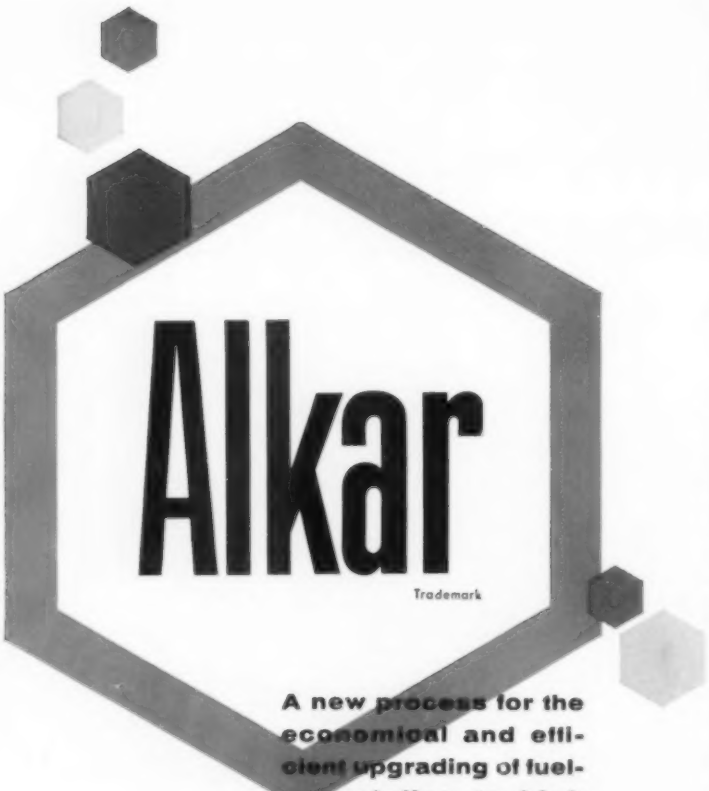
Continental's longstanding policy of engineering the power plant to its work has made dependable Red Seals first choice for a steadily-widening variety of oil field applications . . . There's dependable Red Seal power—L-head or overhead valve—for practically all producing, distributing and processing jobs within the broad Continental output range . . . Products of engine experience dating from 1902, they're backed by parts and service as near as the nearest phone.

SEE YOUR OIL FIELD SUPPLY STORE

WORLD'S LEADING INDEPENDENT MANUFACTURER OF INTERNAL COMBUSTION ENGINES, CONTINENTAL MOTORS OPERATES PLANTS IN ATLANTA, DALLAS, DETROIT, MILWAUKEE, MUSKEGON, AND TOLEDO, AND IN ST. THOMAS, ONT., PRODUCING AIR-COOLED AND LIQUID-COOLED ENGINES FOR USE ON LAND, AT SEA AND IN THE AIR.

Continental Motors Corporation

MUSKEGON • MICHIGAN



A new process for the economical and efficient upgrading of fuel-gas olefins to high value alkylaromatics

Alkar, now being made available to refiners by Universal Oil Products Company, provides the first economical means for the efficient use of ethylene without costly prior separation.

Diversification of refinery products is attained by use of this process through channeling a portion of total output into the important new markets created by the growing demand for petrochemicals.

The favorable economics of Alkar processing allow application of this technique in all sizes of refineries, thus permitting entry of new operators into the petrochemical field.

Alkar is one of many UOP petrochemical and refining processes available to refiners everywhere. We will be glad to provide full information on this or any other UOP process without obligation.

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road,
Des Plaines, Illinois, U.S.A.
More Than Forty Years Of Leadership In Petroleum Refining Technology

New UOP Petrochemical and Petroleum Processes Now Available To Refiners

Two new processes, Alkar and Butamer, recently announced by Universal Oil Products Company, offer a great potential for helping refiners secure maximum profits from their operations. Alkar provides the refining industry with a practical means of enjoying the increasing market for petrochemicals with minimum capital investment and profitable operational ratios. Butamer offers the refiner an economical method of securing isobutane.

The Alkar process permits the utilization of the light olefin content of fuel gas on a much larger scale than has previously been practical for the average refiner. The recovery of this by-product olefin from off-gas streams has been frequently impractical because of the very substantial investments necessary for separation equipment. In the development of the Alkar process, UOP worked on the premise that great economies would result if the by-product olefin could be chemically converted without the necessity of prior concentration. The accomplishment of this with the Alkar process now makes it possible for many more refiners to enter the petrochemical field.

The Alkar process is based on the use of a completely new catalyst. This catalyst, in solid form, is used as a fixed bed in reactors of conventional design. The catalyst being non-corrosive, the use of expensive alloys in reactor construction is unnecessary. It is stable against conditions normally encountered in processing and in the handling required in loading the reactors. Catalyst costs are low and special catalyst handling equipment requirements are at a minimum.

Another potential application of the Alkar process provides for the upgrading of fuel gas value olefins to premium octane motor fuel. This is accomplished by the use of the Alkar process to react the olefins with aromatics produced by catalytic reforming.

The Alkar process is but one of a number of petrochemical processes UOP makes available to the refining industry. For many years UOP's research and engineering staffs have been actively developing processes

Alkar and Butamer processes increase refining profits with minimum investment

which yield valuable chemicals from petroleum raw materials and refinery by-products. To provide a broad range of processes for a refiner's every need, Universal also licenses several processes originated by others. UOP petrochemical processes available to refiners include . . . Catalytic Condensation . . . Olefin Extraction For Butylene Recovery . . . Catalytic Dehydrogenation . . . Hydrar* . . . Udex® (originated by Dow Chemical Company) . . . Two-Stage Unifining* . . . Arosorb* (originated by Sun Oil Company).

The Butamer Process

The Butamer process fills the need for an efficient and economical method for converting normal butane to isobutane. This process is particularly important at this time because of the growing demand for isobutane resulting from the increasing use of alkylate for blending into motor fuels.

This process is the result of extensive UOP research and development to secure an improved normal butane isomerization technique. The accomplishment makes it possible for refiners to have, at minimum capital investment, a practical and profitable means for normal butane isomerization.

The basis of this process is the development of a stable and rugged catalyst, capable of operating at relatively low temperatures. Low temperature operation is essential so that the concentration of isobutane in the effluent from the reactor will be sufficiently high to eliminate excessive recycle of normal butane.

Data obtained with the platinum-containing Butamer catalyst show that temperatures in the range of 600° F. to 850° F. will produce an equilibrium concentration of isobutane in the total butane effluent ranging from 49% to 40%. The process is operated under hydrogen pressure.

A low hydrogen-to-charge ratio is used. The high activity of the catalyst makes it possible to operate the process at economical liquid hourly space velocities. This makes possible a reasonable catalyst inventory.

UOP will be glad to supply, without obligation, individual recommendations for the practical application of its various petrochemical processes to any refining operation, anywhere in the free world.

*Trademark

A new non-corrosive process for the efficient and economical conversion of normal butane to iso-butane

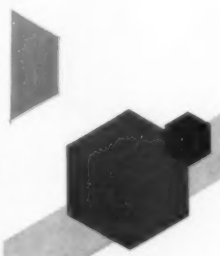
Butamer, now being made available to refiners by Universal Oil Products Company, will help meet the increasing demand for iso-butane.

Development by UOP of a special platinum-containing catalyst permits the efficient production of iso-butane especially as feed for alkylation processes.

Minimum initial investment for Butamer installations is achieved as its flexible design permits economical integration with alkylation units.

Mild operating conditions are used in the Butamer process resulting in little loss to by-products.

Butamer is one of many UOP petrochemical and refining processes available to refiners everywhere. We will be glad to provide full information on this or any other UOP process without obligation.



Butamer

Trademark

UOP® **UNIVERSAL OIL PRODUCTS COMPANY**

30 Algonquin Road,
Des Plaines, Illinois, U.S.A.

More Than Forty Years Of Leadership In Petroleum Refining Technology

ATLANTIC CATFORMING is solving refinery puzzles around the world!

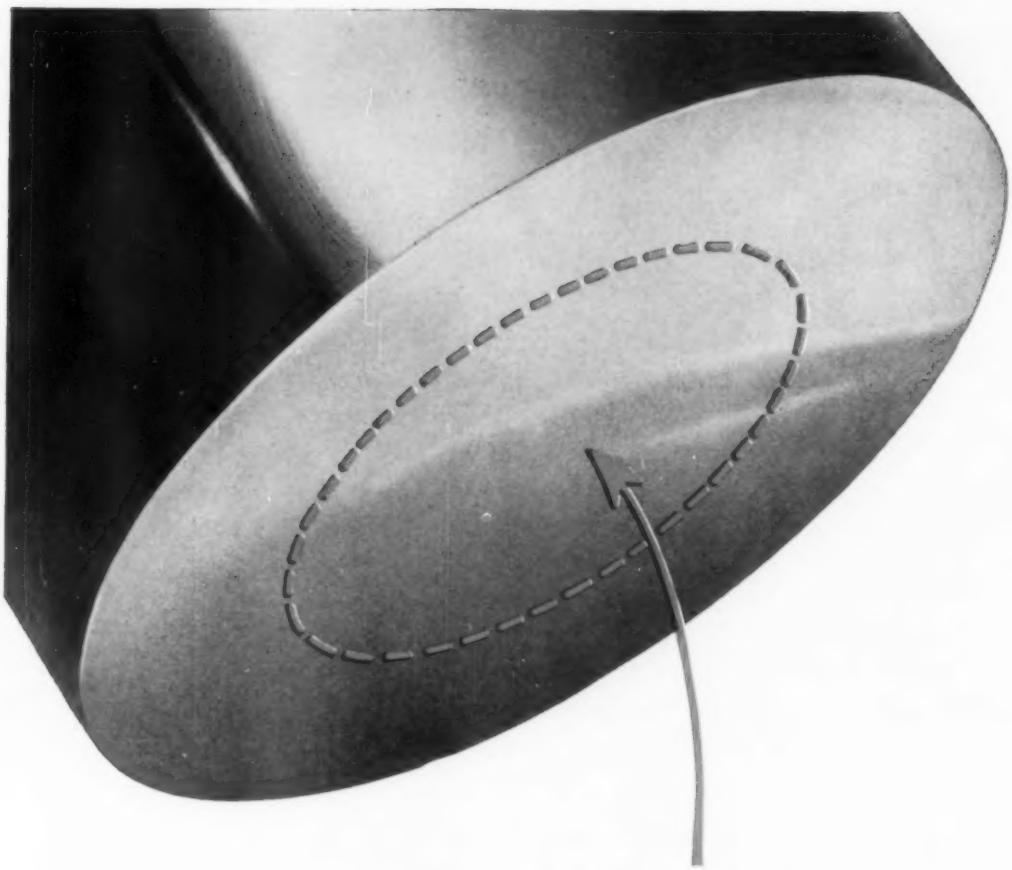
Atlantic's Catforming process is being profitably used in these countries that circle the globe. Naturally, there are important reasons that explain this success. Here they are:

1. **CATALYSTS** Designed for your specific problems.
2. **SELECTIVITY** Achieve superior yields at high octanes.
3. **STABILITY** High activity with long life.
4. **DURABILITY** Tolerance for moisture and nitrogen.
5. **REGENERATION** Extends normal life several times.

For further information on how your plant can use Atlantic Catforming techniques, write or wire The Atlantic Refining Company, P.O. Box 8138, Philadelphia 1, Pennsylvania.

ATLANTIC

it's the CATALYST that counts



Here's where hollow parts makers can find new savings

IF YOU'RE boring out bar stock to make hollow parts, you can save money, time and steel. Start with Timken® seamless steel tubing because:

1. YOU SAVE THE COST OF DRILLING; the hole's already there. Finish boring becomes your first production step.

2. YOU SAVE MACHINE TIME by eliminating this costly, original boring operation. You free screw machine capacity for other jobs, increase machining stations *without* adding machines.

3. YOU SAVE STEEL BY WASTING LESS and using more of the steel you buy. You get more parts per ton of steel, because there's less metal to hog out.

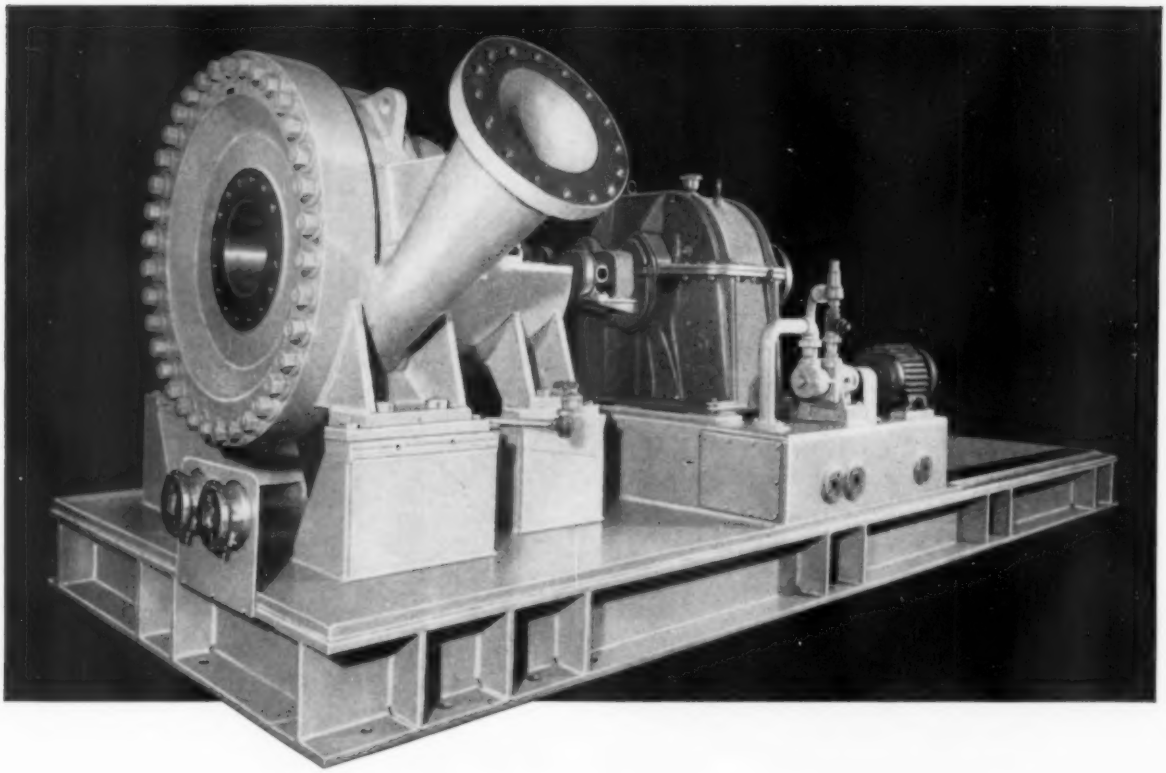
And you get finished parts of better quality from Timken seamless steel tubing. We forge a solid round over a mandrel, thoroughly working the metal inside and out. This rotary piercing operation gives seamless tubing its fine forged quality and unvarying spiral grain flow. Precise control of temperature and piercing speed helps assure you of uniform quality from tube to tube, heat to heat, order to order.

To save even more steel, have our engineers recommend the one most economical tube size for your hollow parts job. We'll guarantee it to clean up to your finish dimensions. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN *Fine Alloy* **STEEL**

TRADE-MARK REG. U.S. PAT. OFF.

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING



NEW

Single-Stage Barrel-Type
Allis-Chalmers Compressor

Boosts High Pressure Gas to Higher Pressure Levels in Range of 50 to 500 psia.

THIS new Allis-Chalmers development extends the range of single-stage compressors into high pressure levels previously handled by reciprocating type units.

The new compressor has all the advantages of a centrifugal compressor — compactness, pulsation-free operation, few wearing parts, easy maintenance.

The unit shown above, now in successful operation, boosts 3690 cfm of air from an inlet pressure of 185 psia to a discharge pressure of 240 psia. It is driven through a speed-up gear by an Allis-Chalmers 1250-hp motor.

The casing consists of three principal parts: the casing cylinder, a bolted casing head and a fabricated casing pedestal. A diaphragm which forms the gas diffuser passage is inserted into the casing cylinder. Excellent gas sealing is assured, since there is only one shaft extension and only one casing joint to seal against gas pressure.

For details, including a sectional view of this new compressor, call your nearby A-C representative, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5728

A clad "sandwich" being assembled prior to hot rolling. Claymont Stainless-Clad Plates—5 to 50% stainless inseparably bonded to carbon steel backing—offer the corrosion and abrasion protection of stainless steel plus the economy of carbon steel. This is another of the many steel plate products available from Claymont's integrated mill.

by d'Arazien

CLAYMONT
STAINLESS-CLAD PLATES

CF&I

CHECK CLAYMONT FOR—Alloy Steel Plates • Carbon Steel Plates • Stainless-Clad Steel Plates High Strength Low Alloy Steel Plates • CF&I Lectro-Clad Nickel Plated Steel Plates • Pressed and Spun Steel Heads • Manhole Fittings and Covers • Fabricated Steel Products Large Diameter Welded Steel Pipe

PRODUCTS OF WICKWIRE SPENCER STEEL DIVISION • THE COLORADO FUEL AND IRON CORPORATION

Plant at Claymont, Delaware • Sales Offices in all Key Cities

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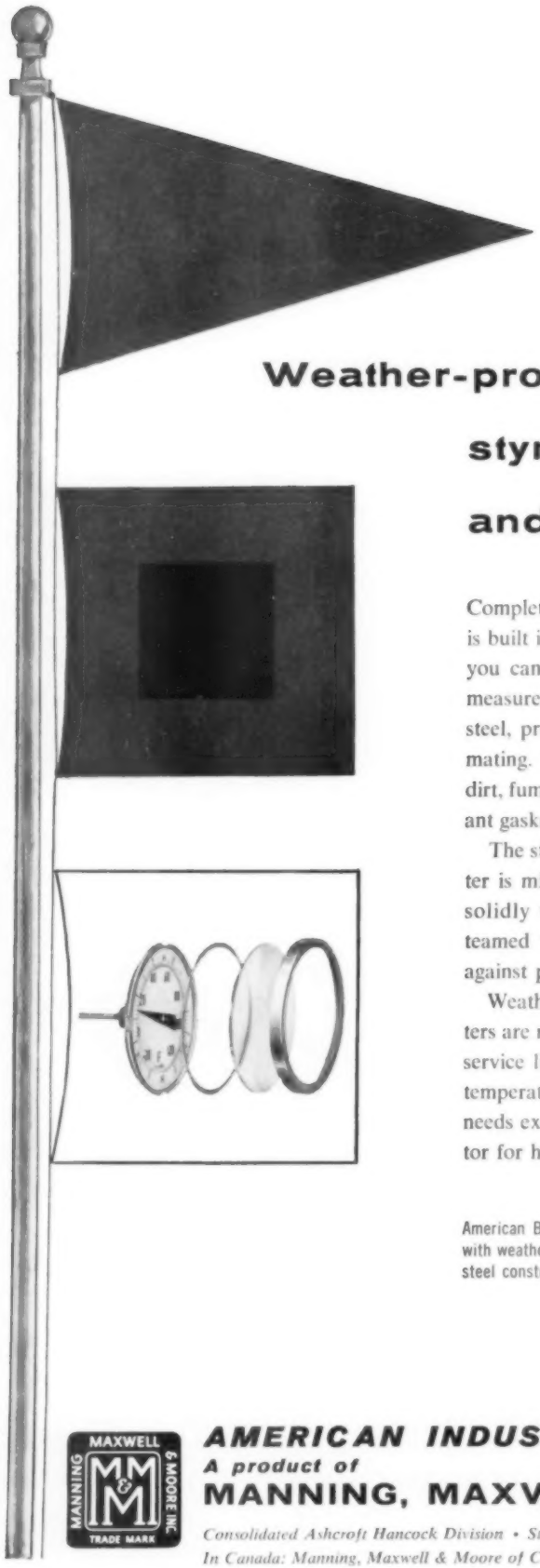


Weather-proof construction stymies erosion and corrosion

Complete protection against erosion and corrosion is built into American Bi-Metal Thermometers, so you can always be sure of accurate temperature measurement. Both case and bezel are stainless steel, precisely fitted and gasketed to insure snug mating. Whatever the weather, rain, sand, dust, dirt, fumes and frost are sealed out by a heat-resistant gasket between case and thick cover glass.

The stem of the American Bi-Metal Thermometer is mirror-smooth stainless steel. All joints are solidly welded. Top resistance to corrosion is teamed with strength, rigidity and tight closure against process pressures.

Weather-proof American Bi-Metal Thermometers are noted for high sustained accuracy and long service life. There are mounting styles, dial sizes, temperature ranges and stem lengths to meet your needs exactly. Ask your industrial supply distributor for help in proper selection.

American Bi-Metal Thermometer with weather-proof stainless steel construction.

MANNING MAXWELL & MOORE INC. M&M TRADE MARK

AMERICAN INDUSTRIAL THERMOMETERS

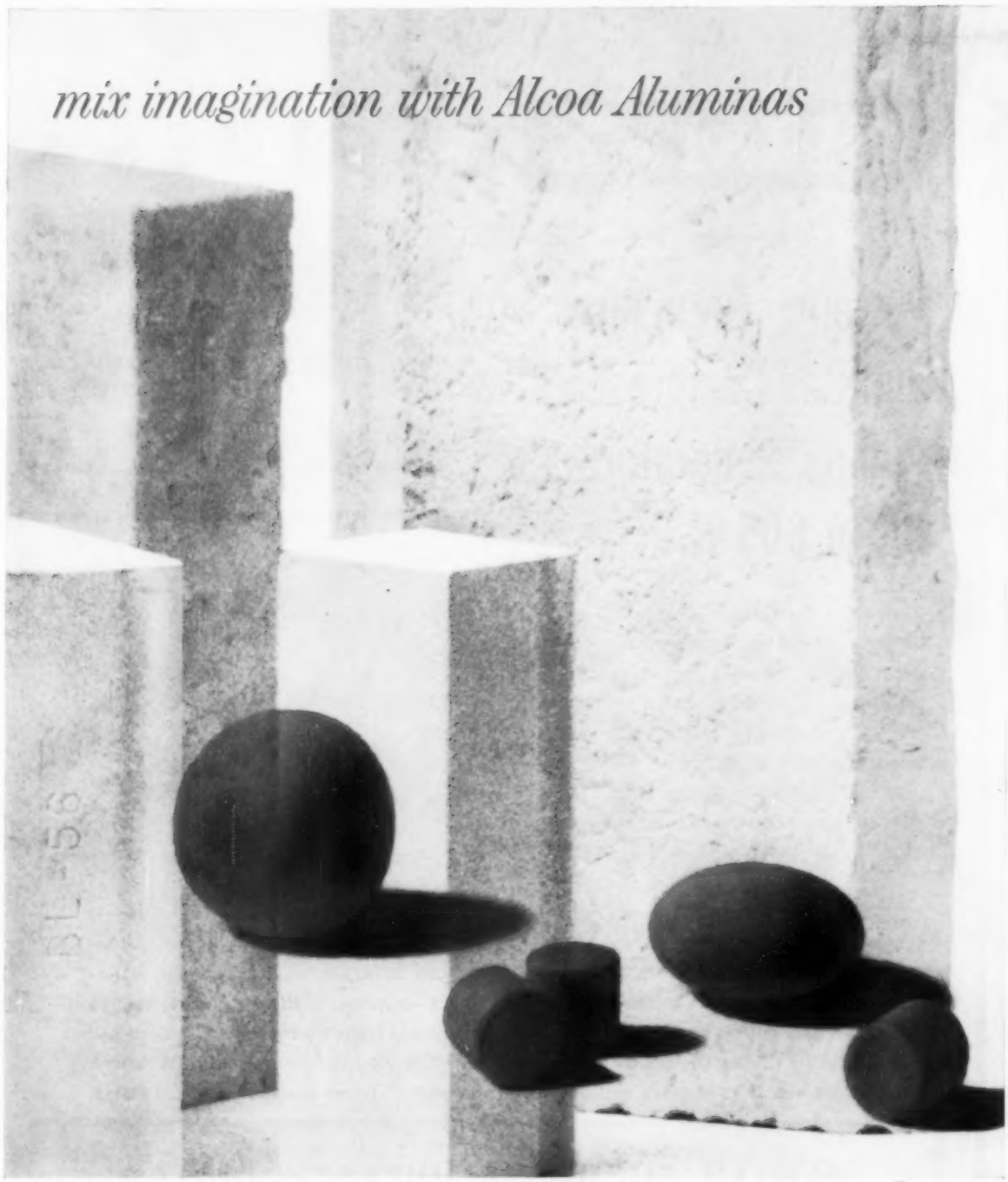
A product of

MANNING, MAXWELL & MOORE, INC.

Consolidated Ashcroft Hancock Division • Stratford, Connecticut

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

mix imagination with Alcoa Aluminas



to beef up these backbones of industry: Few industries could prosper without high performance ceramic refractories, mill liners and grinding media. They are the backbones of industry . . . and they will serve best, serve longest when imaginative engineering puts Alcoa® Aluminas in their composition. These pure aluminum oxides increase refractoriness in direct proportion to the amount used . . . they increase stability and strength under load at high temperatures . . . improve resistance to thermal and structural spalling or deformation . . . minimize corrosion and erosion. Small wonder that users and makers of refractory shapes and castables, ceramic grinding media and mill liners have found it pays to mix imagination and engineering with Alcoa Aluminas . . . for top performance at reasonable cost.

Alcoa does not manufacture refractories, mill liners or grinding media. We do supply aluminas to makers of the best of these products. For their names, write ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 715-F Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA CHEMICALS

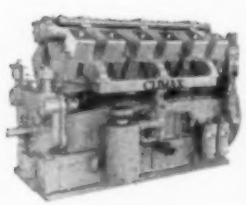
For finer products . . . let Alcoa add new dimension to your creative thinking!

"ALCOA THEATRE" Exciting Adventure ALTERNATE MONDAY EVENINGS

8 CLIMAX ENGINES

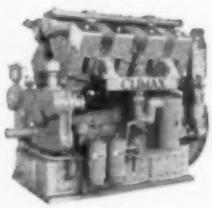
FOR

Powering Rigs, Air and Gas Compressors, Pumps, Generators... Up to 605 H.P.



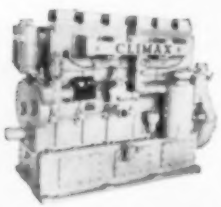
V-125—12 cylinder, 605 max. H.P. at 1200 R.P.M.

V-122—12 cylinder, 520 max. H.P. at 1200 R.P.M.



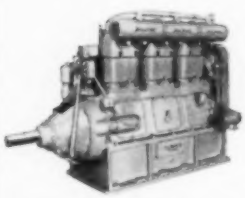
V-85—8 cylinder, 390 max. H.P. at 1200 R.P.M.

V-80—8 cylinder, 340 max. H.P. at 1200 R.P.M.



K-75—6 cylinder, 302 max. H.P. at 1200 R.P.M.

K-67—6 cylinder, 265 max. H.P. at 1200 R.P.M.



R-165—6 cylinder, 192 max. H.P. at 1200 R.P.M.

Climax Oil Field engines are well known for their rugged construction and "ability to take it" under any operating condition. These engines are made of the finest metal alloys and castings available . . . manufactured to precision standards. All models have a 7" stroke—resulting in low piston speeds . . . minimum wear . . . low maintenance . . . and long engine life.

No matter which model you choose you can be assured of extremely low fuel consumption...under constant or varying loads ...high, medium or low R.P.M. operating conditions. All models operate efficiently on natural gas, butane or gasoline.

Your nearby Climax Distributor will recommend an engine or engines, not only to fit your present day requirements . . . but future needs as well. Each Distributor maintains complete stocks of factory guaranteed replacement parts...and well trained, experienced servicemen to answer any emergency—any hour of the day. Ask to see his many case histories and find out for yourself why Climax engines are the most "owner satisfying" prime movers in the Oil Fields.

CLIMAX ENGINE MANUFACTURING CO.
DIVISION OF WAUKESHA MOTOR COMPANY

FACTORY—CLINTON, IOWA

Photo taken at Delaware Refinery, Tidewater Oil Company

They keep the big cats roaring

The healthy roar of production from the big cat crackers is the measure of progress in refining and chemical technology. Teamwork between refiners and Cyanamid chemists helped to bring the development of one of the first synthetic fluid cracking catalysts and the first fully regenerative platinum reforming catalyst. Behind Cyanamid's service as a major catalyst producer are its unlimited resources as a major chemical producer.

Only Cyanamid's man with the golden rule can bring such vast chemical research and development facilities to the service of further refining progress.

Basic in Catalyst Chemistry

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AMERICAN CYANAMID COMPANY • REFINERY CHEMICALS DEPARTMENT • 30 Rockefeller Plaza, New York 20, N. Y.

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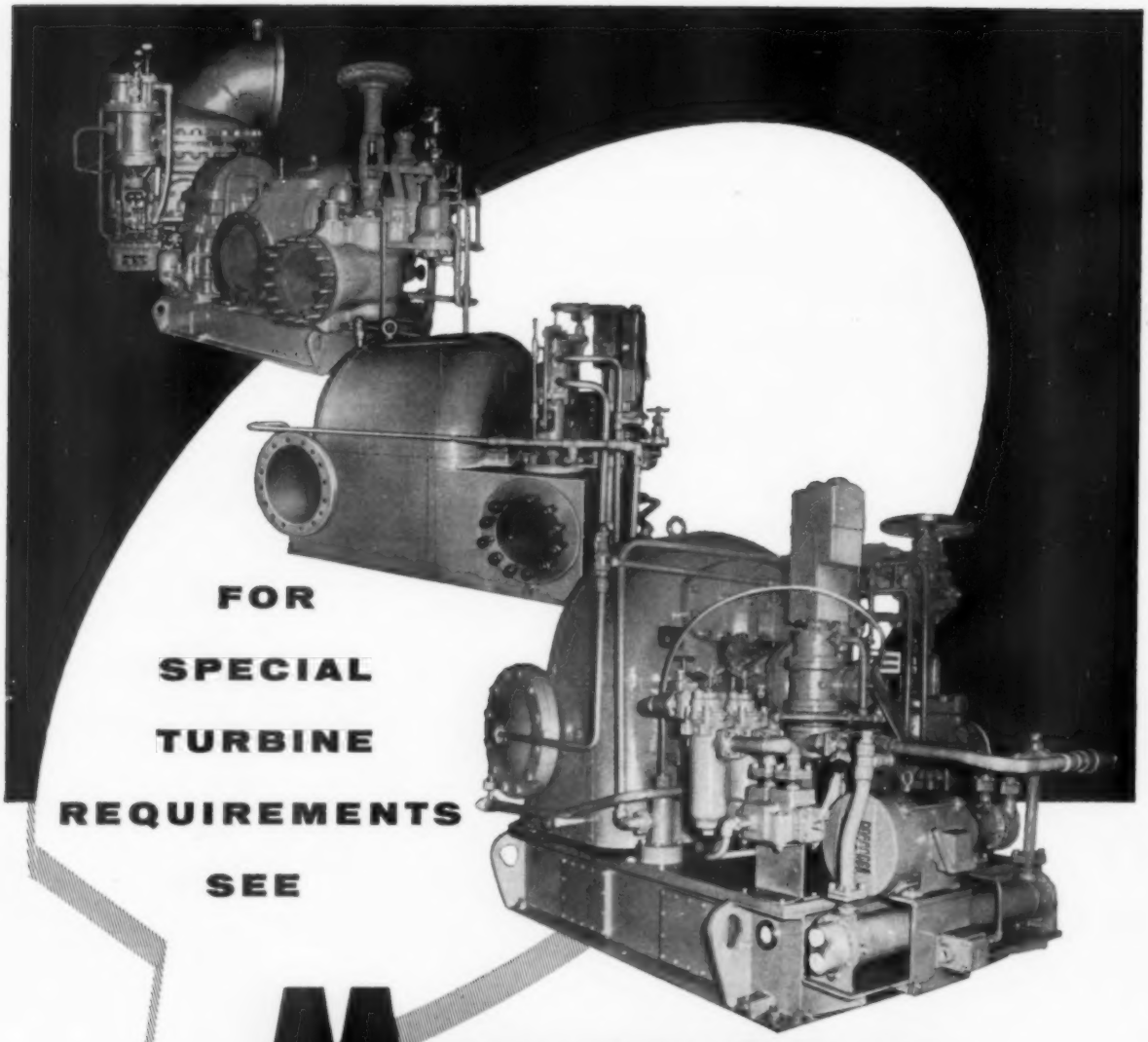

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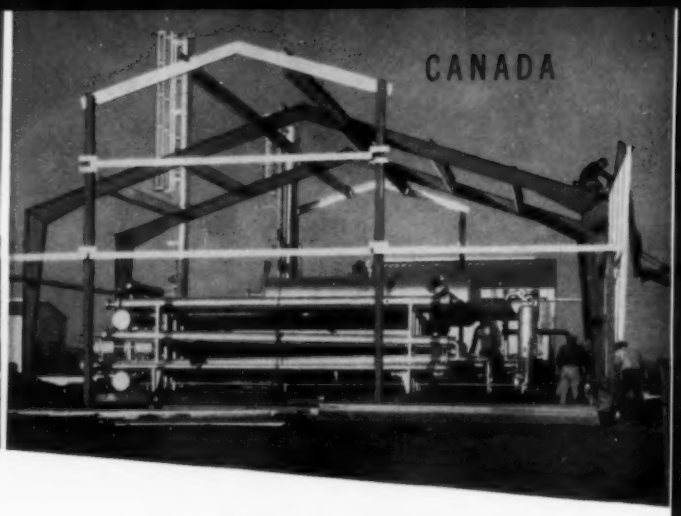
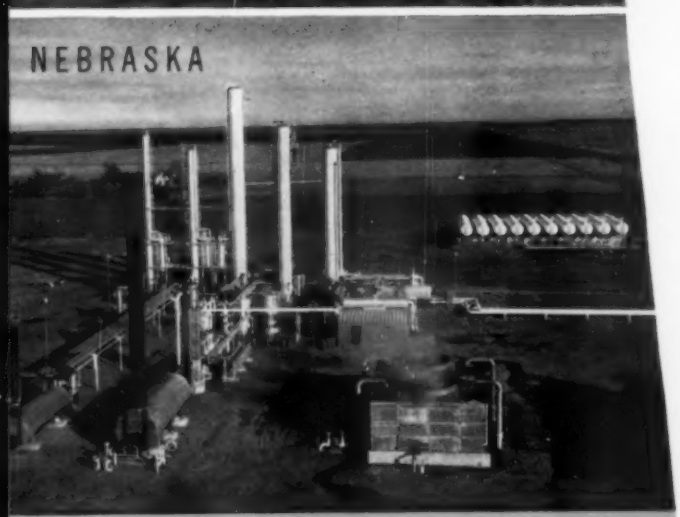
Our nearest representative will help you solve your turbine requirements. His name gladly sent on request.

MURRAY IRON WORKS COMPANY • BURLINGTON, IOWA

Builders of Steam Power Equipment for Nearly a Century





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. . . Today's Most Versatile And Economical Heavy Duty Artificial Refrigeration System For Every Basic Oilfield Application!

Entirely Self Operating. Automatically Adjusts To Load Changes.

Low Initial Cost. May Be Entirely Skid-Mounted Except Ammonia Reboiler. Outside Construction —No Buildings Required.

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Operating Costs Vary In Direct Proportion To The Load.

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Vibration Free. No High Speed Reciprocating Machinery To Mount.

Experts Are Not Required To Operate And Maintain The Unit.

For more information of the applications of BS&B Ammonia Absorption Refrigeration to oilfield or refining processes, contact your BS&B Man — or write to . .

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Oilfield Equipment Division, Dept. 1-A6A
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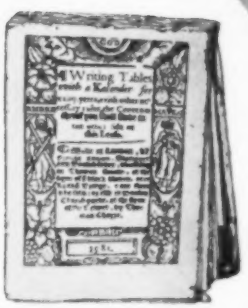
EFFICIENCY
OVER 60 YEARS
BS&B
RELIABILITY
ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

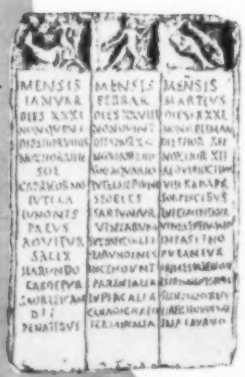
Scandinavian Calendar – Between 8th and 14th Centuries



English Tables – 16th Century

Operating time of Clark Centrifugals

Roman Farmer's Almanac – 1st Century A. D.



Saxon Calendar – About 6th Century

Aztec Calendar Wheel – Before 1479

totals 19 CENTURIES

Operating experience recorded by Clark centrifugal compressors totals 1,981 years. Providing rugged, reliable service 'round the clock, they have compiled this lengthy performance record within the actual time of only 10 years.

When Clark began to build centrifugal compressors a decade ago, pressures of 100 psi. were not considered practical. Today, as a result of Clark advanced engineering and design, Clark centrifugals are operating at over 5,000 psi. From the first, they have proved themselves in the field.

Clark builds two basic types of centrifugals. The horizontally split case type is designed for low to moderately high pressure ranges. The vertically split case type is used for extremely high pressure conditions. With capacities ranging from 1,000 to more than 150,000 CFM., Clark centrifugals are being used in new and ever widening applications throughout the world.

For all the facts about these performance-proved compressors backed by Clark's *encyclopedia of experience*, call your nearby Clark engineer. Or write today for Bulletin 150 to Clark Bros. Co., 1103 Lincoln Avenue, Olean, New York.

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CLARK® — ONE OF THE DRESSER INDUSTRIES

CENTRIFUGAL COMPRESSORS

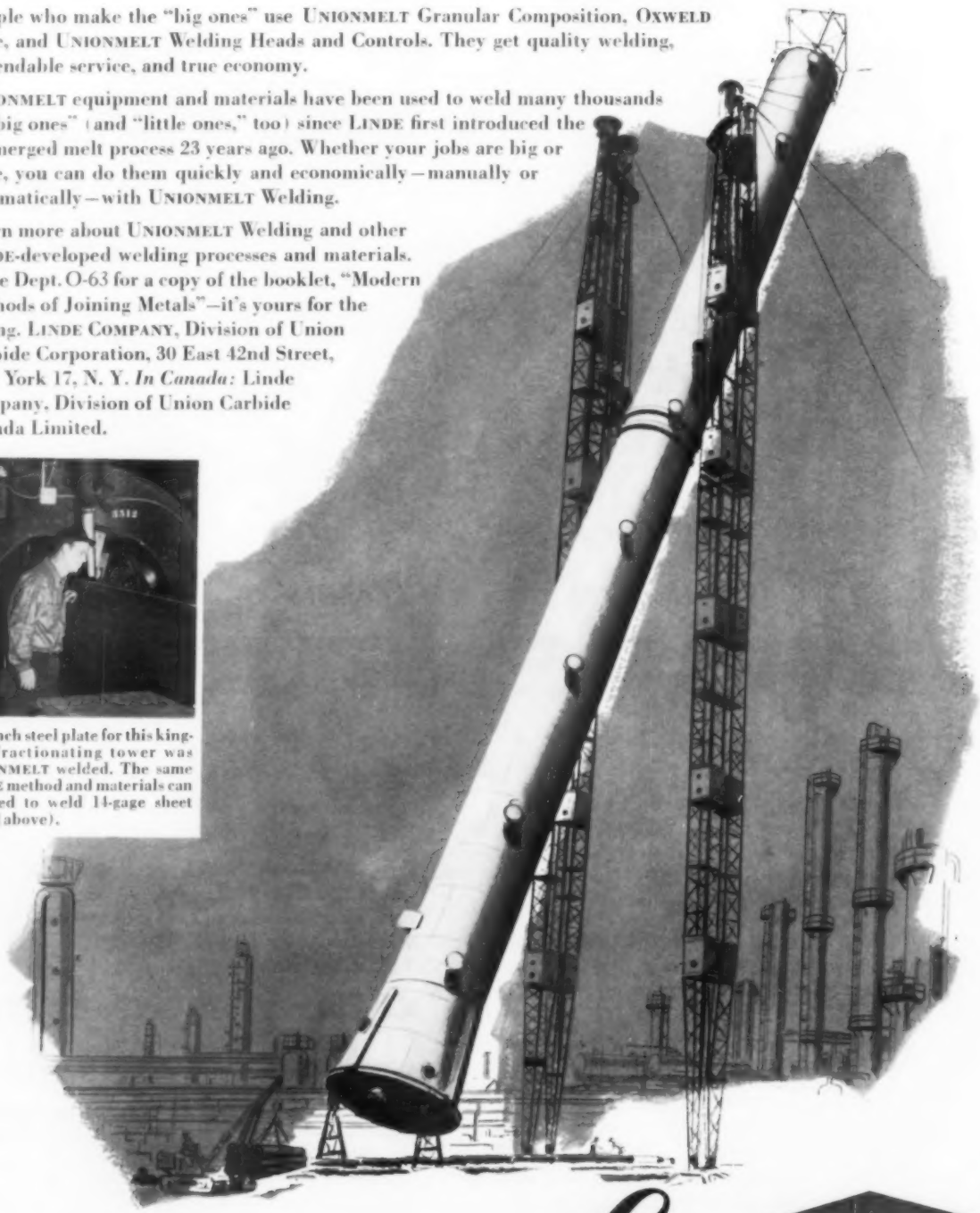
UNIONMELT Welding
makes short work of tall towers

People who make the "big ones" use UNIONMELT Granular Composition, OXWELD Wire, and UNIONMELT Welding Heads and Controls. They get quality welding, dependable service, and true economy.

UNIONMELT equipment and materials have been used to weld many thousands of "big ones" (and "little ones," too) since LINDE first introduced the submerged melt process 23 years ago. Whether your jobs are big or little, you can do them quickly and economically—manually or automatically—with UNIONMELT Welding.

Learn more about UNIONMELT Welding and other LINDE-developed welding processes and materials. Write Dept. O-63 for a copy of the booklet, "Modern Methods of Joining Metals"—it's yours for the asking. LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited.

One-inch steel plate for this king-size fractionating tower was UNIONMELT welded. The same LINDE method and materials can be used to weld 14-gage sheet steel (above).



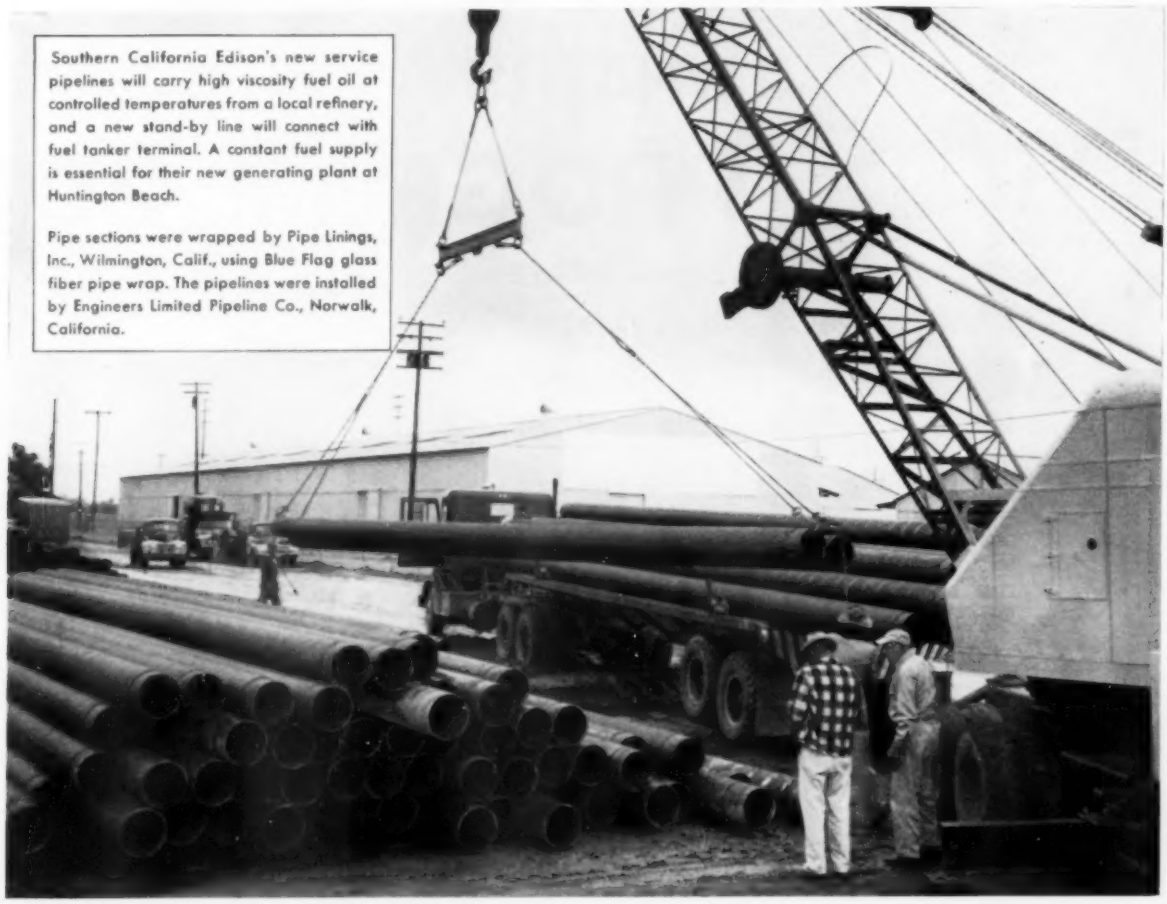
Linde

UNION CARBIDE

The terms "Linde," "Unionmelt," "Oxweld," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

BLUE FLAG® SAFEGUARDS PIPELINE INVESTMENT

for Southern California Edison's New Plant



Southern California Edison's new service pipelines will carry high viscosity fuel oil at controlled temperatures from a local refinery, and a new stand-by line will connect with fuel tanker terminal. A constant fuel supply is essential for their new generating plant at Huntington Beach.

Pipe sections were wrapped by Pipe Linings, Inc., Wilmington, Calif., using Blue Flag glass fiber pipe wrap. The pipelines were installed by Engineers Limited Pipeline Co., Norwalk, California.

One of the prime considerations in securing the best possible protection for your pipeline investment is specifying the *right* reinforcing pipe wrap for your enamel coating.

Blue Flag assures many added years of dependable service with protection against:

Soil Stress—Blue Flag, made from high-strength inert glass fibers, effectively reinforces the enamel coating to withstand soil stress, and the damaging effect of soil chemicals.

"Holidays"—Blue Flag's uniform porosity allows hot enamel to bleed; trapped gas to escape quickly.

Backfill Damage—Blue Flag strengthens protective enamel to resist impact damage and cracking.

For long-lasting, low-cost protection, insist on Blue Flag Reinforcing Pipe Wrap and Duramat Outer Pipe Wrap. Applied over the reinforced enamel, Duramat provides a tough skin, protecting the enamel from mechanical damage during handling, lowering-in and back-filling.

Every day more and more corrosion engineers and pipeline executives are specifying "Blue Flag" for yard, mill and over-the-ditch jobs.

Want More Facts? Write: *L·O·F Glass Fibers Company*
Dept. 78-68, 1810 Madison Ave.
Toledo 1, Ohio

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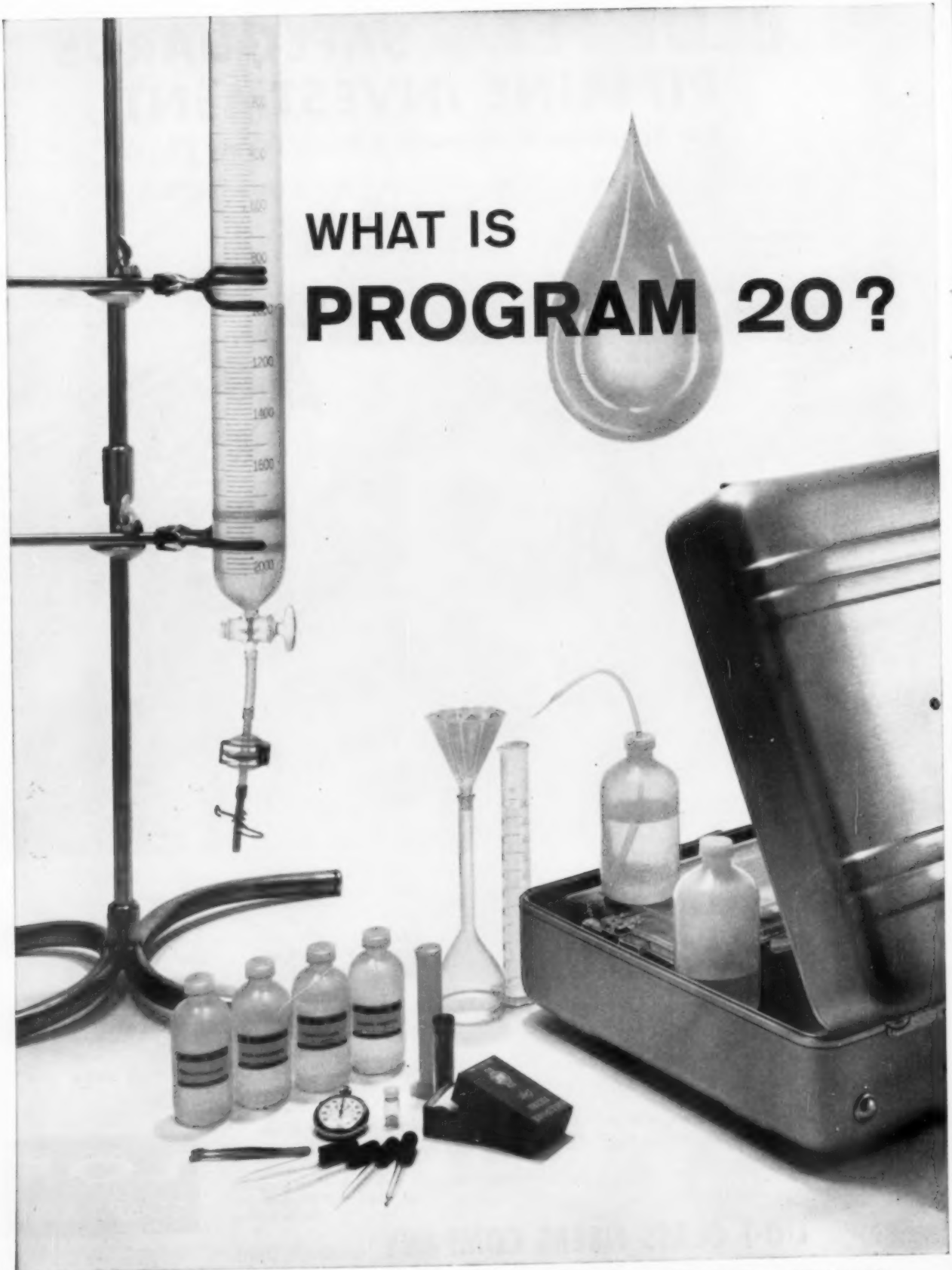
L·O·F GLASS FIBERS COMPANY TOLEDO 1, OHIO


WHAT IS
PROGRAM 20?

This elaborate "flow rate" kit, including unique membrane filter discs, will be used by the Pfizer Program 20 representative in testing your injection water.

IMPORTANT NEW FIELD TEST OF INJECTION WATER QUALITY

In this unique program, 20 college students of the Southwest will also demonstrate the iron sequestering ability of citric acid... give dramatic proof to secondary recovery operators!

● If you are responsible for water flooding operations in Texas, New Mexico, Louisiana, Oklahoma, Arkansas or Mississippi, a man from *Program 20* is coming your way. He is a chemistry or chemical engineering major from one of the leading colleges. He's working for Pfizer this summer – and getting valuable experience!

Pfizer hired him to test the quality of your injection water, to determine the iron content, and to demonstrate the outstanding utility of citric acid in preventing "iron plugging".

He will also give you information on the use of citric and gluconic acids with detergents in well clean out procedures, and information on the use of these same acids in HCl acidizing.

He will leave with you a complete test report and a Fact File that includes comprehensive technical information and research data for secondary oil recovery. **The test and data are FREE.**

This is an unusual opportunity for you!

Welcome the man from Pfizer Program 20!

Pfizer

PROGRAM 20

CHAS. PFIZER & CO., INC.
Program 20 Headquarters
7600 Ambassador Row, Dallas 35, Texas

Please have a *Program 20* man contact me:

Name _____

Title _____

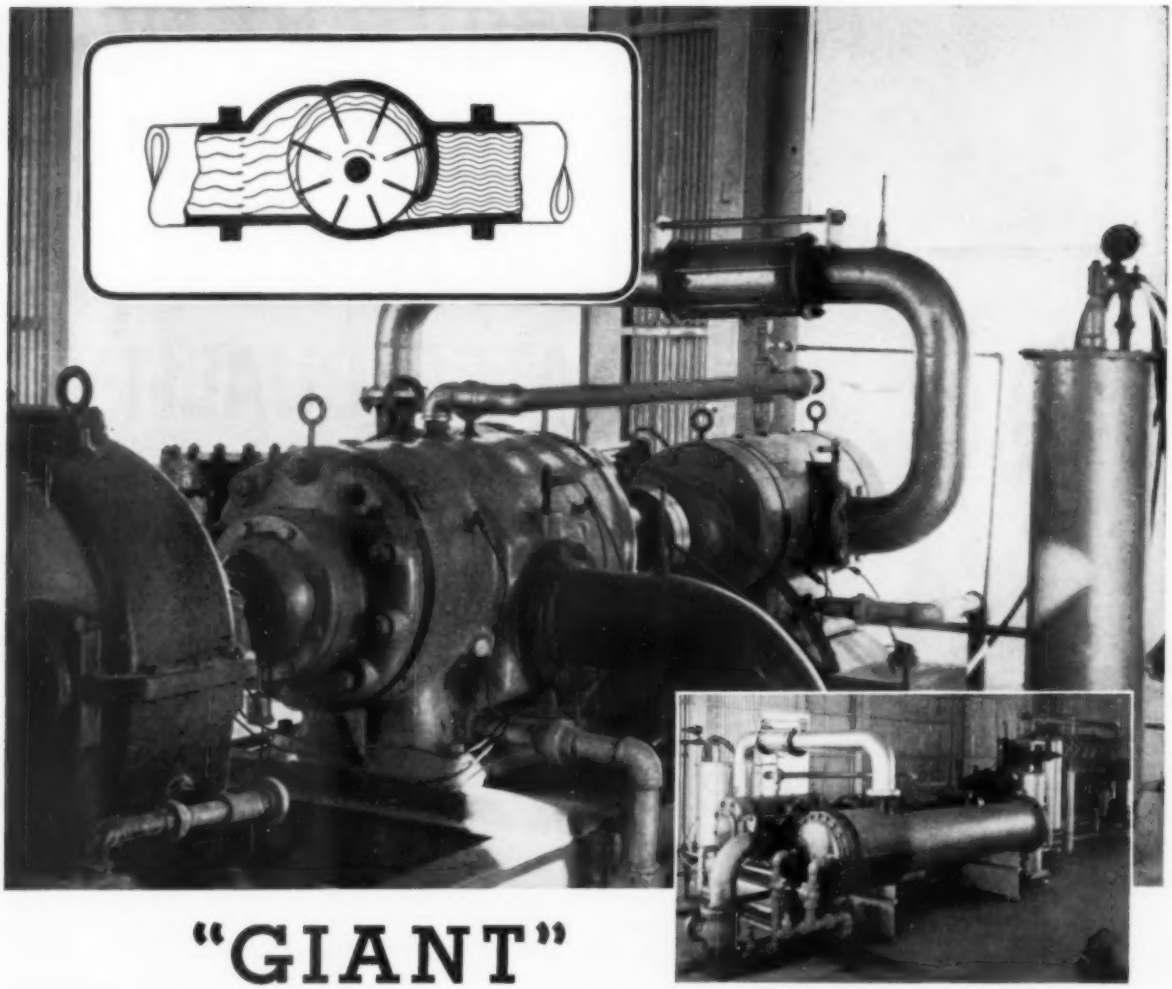
Company _____

Address _____ ☐

Telephone _____

Flood Site Location _____ ☐

Check the location where you would like to be contacted.



"GIANT"

ANOTHER FULLER ROTARY COMPRESSOR INSTALLATION

Everything's big in Texas and compressors are no exception—not particularly in physical size but big in service!

That's why you'll find so many Fuller rotary compressors in use where trouble-free gas gathering and boosting, as well as refinery gas recirculation is demanded at low cost, peak output, with minimum attention.

Oil men know what they'll get when they specify a Fuller rotary compressor. Here are the plus features: compactness; ease of installation; elimination of valves, crank-shafts, pistons, and other moving parts, greatly reducing "down time" for inspection and maintenance. Metering problems and pressure fluctuations are reduced to a minimum because of rotary motion. Blades held out by centrifugal force, compensate for wear, maintaining original capacity for the life of the machine.

Shown here is another Fuller rotary installed in Texas. It's a C-200-200H, two-stage compressor driven by a gas engine through a gear reducer for boosting casing head gas from 5-lb. to 115-lb.

Write for Fuller Compressor literature.

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
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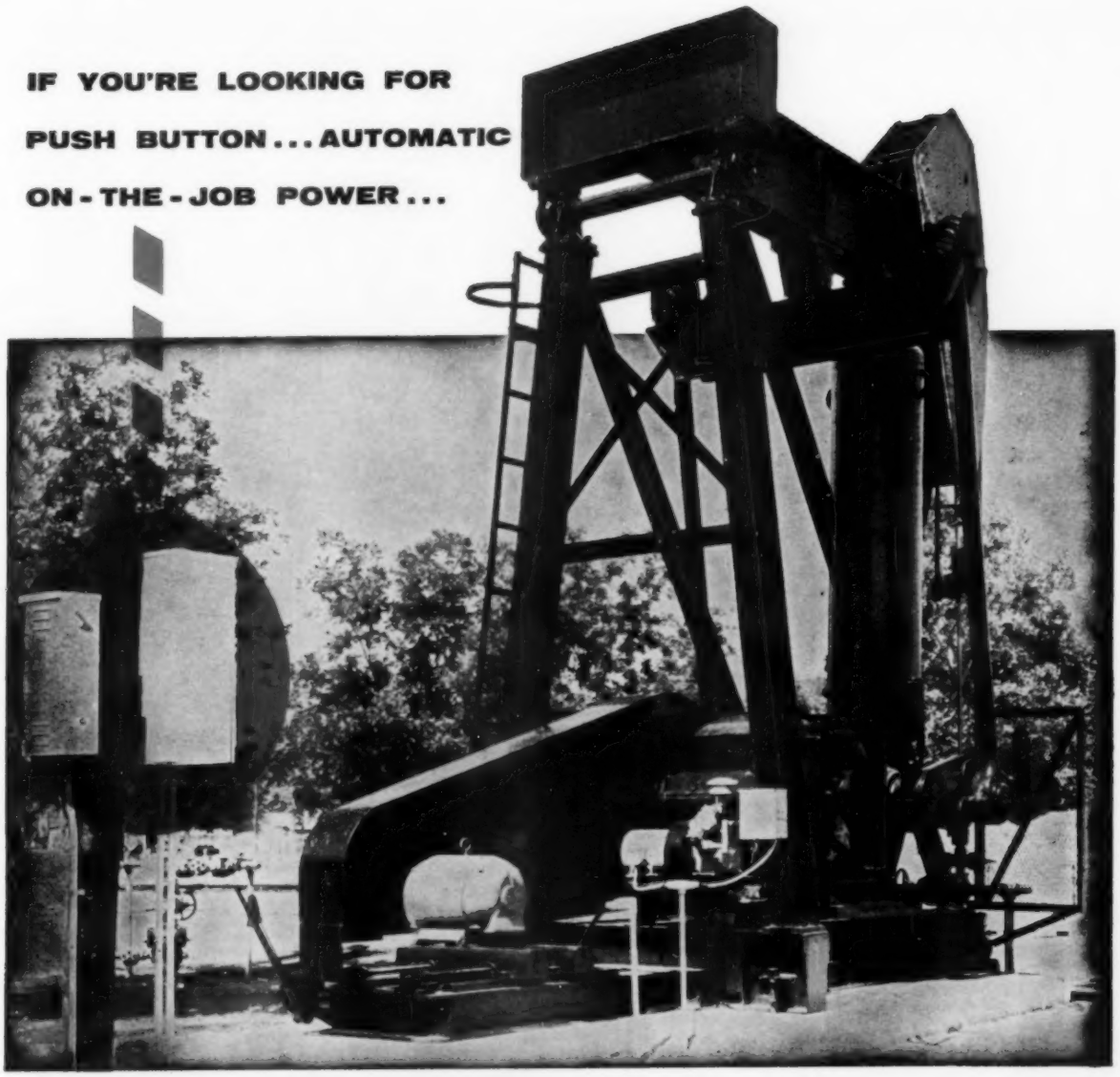
IF YOU'RE LOOKING FOR

PUSH BUTTON... AUTOMATIC

ON-THE-JOB POWER...



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Automation is the key word in more efficient and progressive management today. And when you think of *automation* you must associate it immediately with UTILITY ELECTRIC POWER. Only UTILITY ELECTRIC POWER provides the complete, fully automatic features of automation in oil field production. The evidence is so impressive in favor of UTILITY ELECTRIC POWER that all companies – who consider themselves progressive – will want to know how they can benefit from this modern, efficient power. Call the sales engineer of your Utility Electric Service Company for complete facts.

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P. O. BOX 35006 DALLAS, TEXAS

THERE'S GOOD NEWS TODAY...

at PROCON

Philadelphia, Pennsylvania—Work was recently completed on two 26,000 B/SD Platforming® units at Gulf Oil Corporation's Philadelphia refinery by Procon Incorporated. Two 26,000 B/SD Hydrobon® units used with the Platformers were also built by Procon. The Platformer heaters were the largest ever built. Procon engineers recommended single heaters for each Platforming unit instead of two smaller heaters for best use of available space and maximum construction economy.

London, Ontario, Canada—Procon (Canada) Limited recently completed the installation of flaking mills, ovens, conveyors, dust collection systems and related equipment as part of a plant modernization program for Kellogg Company of Canada, Ltd. This construction covered improvements to Kellogg's cereal processing plant at London, Ontario.

Al Kuwait, Kuwait—Work is proceeding on 4,000 B/SD Platforming-Unifining* units and a 7,200 B/SD prefractionator being built by Procon (Great Britain) Limited for Kuwait Oil Company at Kuwait on the Persian Gulf. Work covers mechanical and structural design, engineering, procurement, inspection and supervisory services for Kuwait.

Heide, Germany—Construction was recently completed on a 4,000 B/SD Platforming unit under the supervision of Procon (Great Britain) Limited for Deutsche Erdol-Aktiengesellschaft (DEA). This is part of an extensive reconstruction program, and will supply premium gasoline to Northern Germany and Denmark.

Bakersfield, California—The construction of Mohawk Petroleum Corporation's 925 B/SD Unifining unit was recently completed by Procon Incorporated. This unit processes thermally cracked naphtha derived from California crude. The Unifining unit was built at Mohawk's Bakersfield, California, refinery.

Procon service is available to the oil refining, petrochemical and chemical industries, anywhere in the world. New plant construction, expansion or modernization, whatever the requirement, Procon will do it right, and on time.

*Trademark

PROCON *Incorporated*

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WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

A truckload of pumps going to one customer's waterflood project.

The versatile TP's....

BETHLEHEM'S HIGH-PRESSURE TRIPLEX PUMPS

In waterflooding, salt-water disposal, and many other oil-field pumping operations, nothing outperforms the Bethlehem triplex units. They're rugged, tough, built to withstand unusual punishment. You can count on them for the jobs where continuous, full-load assignments are common.

Complete pumps, ample stocks of parts, and expert field service are obtainable at Bethlehem Supply stores.

These TP features reflect sound engineering:

- **High volumetric efficiency**
- **Direct-flow suction and discharge**
- **Controlled flood lubrication**
- **Extra-large shafts and bearings**
- **Fluid end available in molybdenum alloy iron, cast steel, or aluminum-bronze. Proper trim for each selection**
- **Plungers of hardened steel, stainless steel, or solid ceramic**
- **Optional speed reducer, easily installed in the field**
- **All parts readily accessible**
- **Simple construction throughout**

TP Pumps excel in jobs like these:

Waterflooding • Salt-water disposal • Pumping natural gasoline, refined products, and LPG products • Crude and lean-oil service • Supplying oil to subsurface hydraulic pumping systems

Choose from these three sizes:

Model	Type	Plunger Load, lb	Input hp	Bore and Stroke, in.
TP-3	Triplex	3,580	22 @ 250 rpm*	1¼ to 2¼ x 3
TP-4	Triplex	5,500	46 @ 250 rpm*	2 to 4 x 4
TP-6	Triplex	10,000	100 @ 200 rpm*	2 to 4½ x 6

*For higher ratings, refer to General Offices, Tulsa, Okla.

Need more volume?

Then investigate Bethlehem's U-series pumps:

U-33	Duplex	2,400	11 @ 140 rpm	1¾ to 3 x 3
UA-46	Duplex	5,000	40 @ 120 rpm	2½ to 4 x 6
U-510	Duplex	12,000	100 @ 75 rpm	3 to 5½ x 10

BETHLEHEM SUPPLY COMPANY
General Offices: 21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.
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BETHLEHEM SUPPLY

BETHLEHEM STEEL

BETHLEHEM SUPPLY

These valves will

NEVER NEED "LUBRICATION"

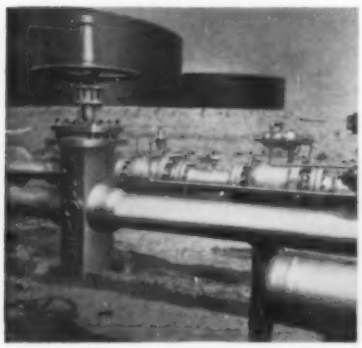
Grove Seal-O-Ring Gate Valves eliminate these costly maintenance and operating problems:

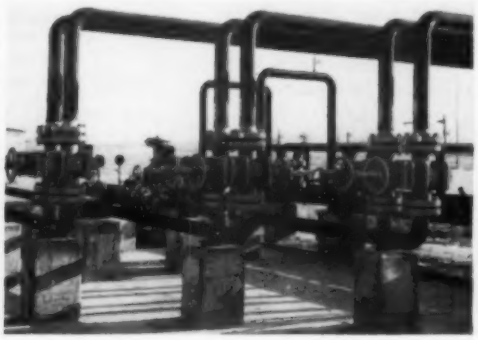
- No lubricants or sealing compounds needed
- No time or labor wasted in lubrication
- No sticking due to loss of lubricant
- No leaking from failure to lubricate
- No damaged gates or seats caused by improper lubrication
- No contamination of product or fouling of adjacent metering or control equipment

The squeegee action of the exclusive *Seal-O-Rings*, which are always in contact with the gate, wipes both sides immaculately clean. This maintains precision factory finish on the sliding surfaces, insuring full freedom of movement – without need for lubricants or sealing compounds. Bearings and stem seals are factory packed for a lifetime of normal service. For 2" to 36" lines – for oil, water, gas – specify *Seal-O-Ring*, the gate valve that's proved it can take care of itself year in and year out.

704

Write for colorful new Pipeline Valve Bulletin No. G-571





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NEW WATERFLOOD PUMP

Worthington KCA pump offers you highest displacement, most pressure, low cost

The new KCA waterflood and salt water disposal pump has just been introduced by Worthington. This new pump has the highest displacement of all comparable competitive models—fully 23% more barrels per day. It also delivers the most pressure. And it's priced at only $38 per input horsepower.

The KCA has 6 outstanding economy and efficiency features:

1. **Interchangeable plungers** over widest available diameter range (1¼ to 2½ inches). Permits changes within any stuffing box range without changing fluid end. Available as ceramic or hardened stainless steel.

2. **Straight-flow design** for maximum volumetric efficiency.

3. **Maximum stuffing box accessibility.** There are no partitions in power end cradle.

4. **Suction air chamber,** packing and stuffing box cover are standard equipment.

5. **Large pipe connections,** 3 inch suction, 2 inch discharge on either side.

6. **Wing-guided valves,** liberally sized suction and discharge valves both removable through single top cover.

For details, see your Worthington district office. Or write: Worthington Corporation, Section 32-1, Harrison, N. J.

WORTHINGTON

HIGHEST DISPLACEMENT

Worthington KCA	2300
Brand A	1860
Brand B	1590
Brand C	1300
Brand D	1055

MAXIMUM DISPLACEMENT IN BARRELS PER DAY*

*At normal ratings. Some manufacturers, including Worthington, will permit higher speeds, capacity and horsepower after approving suction conditions. Best performance, however, is obtained by staying within normal ratings.

MOST PRESSURE

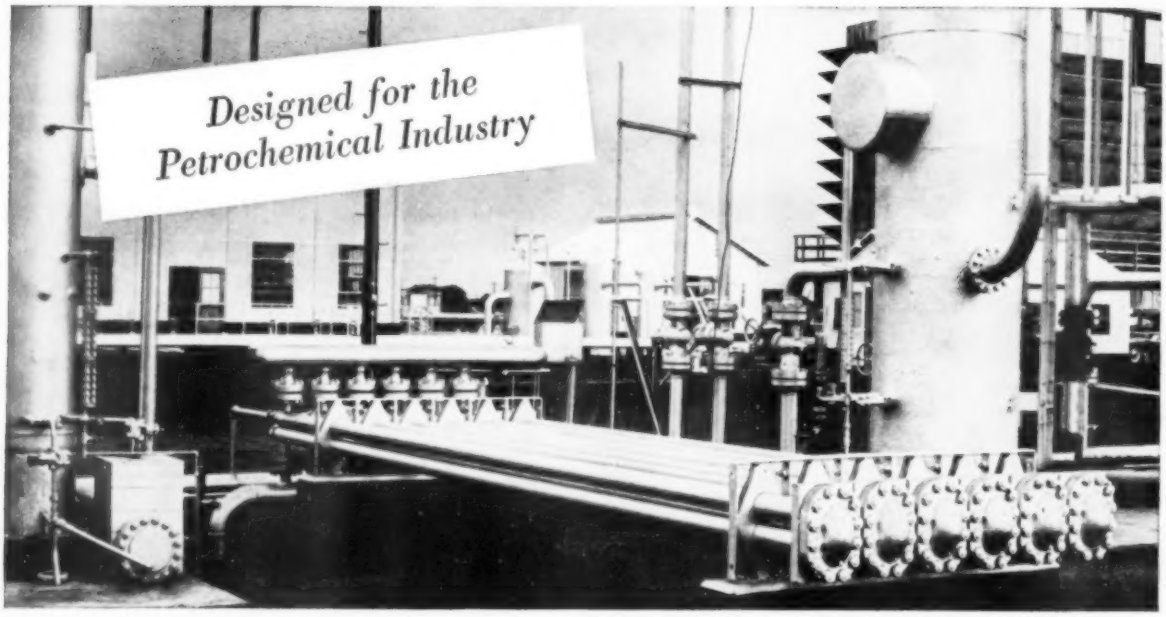
Worthington KCA	3100
Brand A	3000
Brand B	3050
Brand C	1490
Brand D	1550

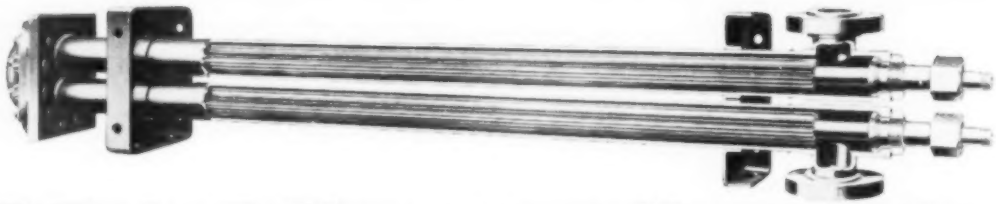
MAXIMUM PRESSURE—PSI

LOW COST

Worthington KCA	$38
Brand A	35
Brand B	46
Brand C	58
Brand D	47

COST PER INPUT HORSEPOWER—NORMAL RATINGS





G-R Twin G-Fins...versatile and simple

Griscom-Russell Twin G-Fin Sections are the simplest type of heat exchanger—therefore, they're the easiest to maintain and use.

Their simple construction—a finned tube within another tube—makes their operation foolproof and simplifies repair and cleaning when necessary.

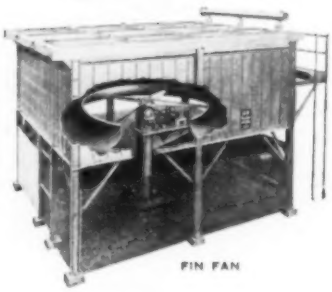
Individual Twin G-Fin Units can be connected in series or parallel in any number required for use as gas or fluid heaters and coolers, reboilers, condensers, and vapor and liquid heat exchangers. Capacity can be easily added or removed and the units can be reused in different services and locations easily.

Send for Griscom-Russell Bulletin 1401R

PLATE FIN EXCHANGER

REBOILER

CONDENSER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G-R Designed for the Petrochemical Field

Reboilers • Fin Fans • Condensers • Plate Fin Exchangers • Longitudinally and Helically Finned Tubing • Bentube Evaporators • Liquid Heaters • Tubular Heat Exchangers • Solution Heaters • Oil and Water Coolers • Tank Heaters • Gas Coolers • Bentube Sections

Griscom-Russell

GENERAL PRECISION EQUIPMENT CORPORATION GPE

THE GRISCOM-RUSSELL COMPANY, MASSILLON, OHIO

A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

HEAT EXCHANGE EQUIPMENT
FOR THE PETROCHEMICAL INDUSTRY

They Say—

Chinese well's 600 bbl.

Dear Sir:

Once again, how much did that well in China produce? (OGJ, May 26, p. 75).

At 189 tons in 138 minutes, or 1.37 tons per minute, rate would greatly exceed 600 bbl. daily . . .

A Bartlesville, Okla., reader.

Editor's note: We won't defend the figures of 189 tons on a 138-minute test, which were put out by the Chinese. But our sharp-eyed reader is right and catches us with our days and hours confused. The figure works out to around 600 bbl. per hour, depending on gravity.

High price of FPC justice

Dear Sir:

The article . . . (Interview with FPC Commissioner W. R. Connole, "How Far Should Gas Regulation Go?" OGJ, June 2, p. 70) was read with care and interest.

In each paragraph we expected to get some answers to the most pressing problem which is today confronting the small gas producer. As presently handled by the FPC, the price of justice is beyond his reach.

The ordinary expense of employing attorneys, statisticians, reservoir engineers, geologists, investigators, and experts in all necessary lines, and then presenting a case to the examiner and next to the commission, in cases where there are intervenors and where the staff is noncooperative, ranges from $100,000 to $750,000.

This means that after having taken the unusual risks associated with wildcatting (in which 90% lose completely, thus never getting to the FPC), the small operator who is in a measure successful must then sell his gas for half its market value because he doesn't have the price of the battle.

Therefore, you are not surprised that I looked anxiously through your article in the hope that there might appear some recommendation for the promulgation of a simple set of rules whereby the FPC staff and intervenors would be required to stipulate the issues at least 6 weeks prior to beginning hearings, and thereby enable the applicant (producer) to know what would be required of him by way of proof.

This simple method would reduce the expense by at least two-thirds, and should correspondingly reduce the work of the commission. With the reduced work load, more careful consideration could be given to the merits of respective cases and to determining whether contract prices are reasonable or just.

The U. S. District Courts' pretrial procedure is, in the main, admirably suited to hearings before the FPC examiners. One of those courts would afford full opportunity to develop the facts upon all essential issues, to make a full record, and would render a judgment within 1 to 5 days.

To cover the same ground before the FPC examiner and the commission not infrequently requires from 1 to 3 years. This is unfortunate for the consumer and the producer.

Charles E. Thompson
Attorney
McAllen, Tex.

Thoughts on Retirement

"We may not like to face squarely the fact that our modern business organization is less personal than those our fathers knew, but such is certainly the case.

"In the past, a strong, virile character, directing his own personal business, carried on as long as he could stand on his feet—sometimes longer—and not always to the best interests of his enterprise.

"Now these same strong, virile characters, no matter how exalted their positions, become mere temporary organs of the modern business organization—cells in its body. To keep the corporate body young and strong, just as in life itself, these cells must drop away as fresher material is ready to take their places.

"A fixed retirement program is the best rubbish remover ever devised for this purpose. While it is true, it removes some usable talents, the residue of salvageable ability need not be lost to our economy if the person involved chooses to use it. The good years that remain for him are his bonus over and above the pension he has earned.

"There will always be those for whom the last few years before retirement will be an unproductive coast until the time is up. A later age policy only multiplies this problem. So, let's face up to retirement at 65 and spend our energies on means to make it exciting and rewarding. Let's determine to dispel from our minds the enervating worry over 'what's going to happen to me.'"

Tom P. Walker, recently retired chairman of the board, Transcontinental Gas Pipe Line Corp., in a speech to the Southern Gas Association.

Blaming the wrong villain?

"There is no doubt that the domestic oil industry is suffering a loss of market to foreign-produced oil and an even more serious threat to American workers lies in the increased importation of foreign refined petroleum products. . .

"But, I would like to point out that besides imports, there are more critical factors at work and perhaps government regulation of the natural-gas industry is primary among these. . .

"In terms of crude-oil production, the natural-gas industry now furnishes the equivalent of 4,880,000 bbl. daily. The increase in the production of natural gas and liquids in the last 10 years alone has supplemented the equivalent of over 3,480,000 bbl. daily.

"Government control has, for practical purposes, frozen natural-gas prices at their levels of over 2 years ago and that industry is thus supplying petroleum energy in competition with crude oil at a discount of about 75% at the wellhead.

"I think that this is a clear example of the harm that has been done to our industry by the government regulation we have now.

"Whenever we appraise the relative prosperity of our industry, it is important to note that other basic industries, such as steel, are also operating at rates substantially less (approximately 55%) than their normal capacity. We are not alone in this recession, but I am afraid many of us have looked in the wrong direction for the real cause of our troubles. . .

"It would seem fair to say that the distress in our industry can be traced, firstly, to the government control of natural gas; secondly, to the fact that demand for crude is related directly to the depressed industrial activity of our country; and, thirdly, to imports of foreign crude and products."

E. R. Barry, vice president, Hanley Co., in testimony to the House ways and means committee.

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*Trademark

CALENDAR

JUNE

23-25 Interstate Oil Compact Commission, midyear meeting, Hotel Utah, Salt Lake City.

24-27 Canadian Gas Association, fifty-first annual meeting, Manoir Richelieu, Quebec.

25-26 Western Petroleum Refiners Association, Mid-Continent regional technical-industrial relations meeting, Broadview Hotel, Wichita.

28-July 2 Petroleum Equipment Suppliers Association, twenty-third annual meeting, Chateau Frontenac, Quebec.

JULY

23-26 Wyoming Geological Society, thirteenth annual field conference, Powder River basin.

24 Illinois Oil and Gas Association, American Petroleum Institute, joint meeting and annual oil men's outing, Meadow Woods Country Club, Centralia, Ill.

AUGUST

11-14 Society of Automotive Engineers, National West Coast meeting, The Ambassador, Los Angeles.

18-19 North Dakota Oil and Gas Association, annual meeting, Grand Pacific Hotel, Bismarck, N. D.

18-20 American Institute of Chemical Engineers, American Society of Mechanical Engineers, second annual heat-transfer conference, Edgewater Beach Hotel, Chicago.

19-22 American Institute of Electrical Engineers, general meeting, Sacramento.

25-27 Appalachian Gas Measurement Short Course, University of West Virginia, Morgantown, W. Va.

SEPTEMBER

7-12 American Chemical Society, fall meeting, Chicago.

10-12 National Petroleum Association, fifty-sixth annual meeting, Traymore Hotel, Atlantic City, N. J.

10-13 Intermountain Association of Petroleum Geologists, ninth annual field conference, Paradox basin.

14-19 Instrument Society of America, thirteenth annual instrument-automation conference and exhibit, Convention Hall, Philadelphia.

15-16 Independent Natural Gas Association of America, annual membership meeting, Roosevelt Hotel, New Orleans.

15-17 American Institute of Electrical Engineers, conference on petroleum, Baker Hotel, Dallas.

18 Natural Gasoline Association of America, Rocky Mountain regional meeting, Gladstone Hotel, Casper, Wyo.

21-24 American Society of Mechanical Engineers, petroleum division, mechanical engineering conference, Cosmopolitan Hotel, Denver.

24-25 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

25-26 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

29-Oct. 3 Society of Automotive Engineers, national aeronautic meeting, aeronautic production forum, and aircraft engineering display, The Ambassador, Los Angeles.

OCTOBER

1-2 Western Petroleum Refiners Association, third annual stream-pollution and waste-disposal conference, Lassen Hotel, Wichita.

1-3 American Association of Oilwell Drilling Contractors, eighteenth annual meeting, Adolphus and Baker Hotels, Dallas.

3 American Institute of Chemical Engineers, South Texas section, thirteenth annual technical meeting, Moody Center, Galveston, Tex.

5-8 Society of Petroleum Engineers of AIME, fall meeting, Houston.

5-8 National Association of Corrosion Engineers, northeast region, Somerset Hotel, Boston.

7-8 Texas Mid-Continent Oil and Gas Association, annual meeting, Statler-Hilton Hotel, Dallas.

9-10 California Natural Gasoline Association, thirty-third annual fall meeting, Huntington-Sheraton Hotel, Pasadena, Calif.

12-18 OIL PROGRESS WEEK.

13-15 American Gas Association, annual convention, Atlantic City, N. J.

13-15 American Society of Mechanical Engineers, American Society of Lubricating Engineers, conference on lubrication, Statler Hotel, Los Angeles.

13-16 Society of Exploration Geophysicists, annual meeting, Hotel Gunter, San Antonio, Tex.

13-17 American Society of Civil Engineers, annual convention, Hotel Statler, New York.

15-16 South Dakota Independent Oil Men's Association, convention, Sheraton-Johnson Hotel, Rapid City.

15-17 National Association of Corrosion Engineers, north central region, Cincinnati.

16-17 Society of Petroleum Engineers of AIME, Southern California petroleum section, Biltmore Hotel, Los Angeles.

16-18 New Mexico Geological Society, Arizona Geological Society, ninth annual field conference, Black Mesa basin, registration Gallup, N. M., Oct. 15.

19-21 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Adolphus, Dallas.

20-24 National Association of Corrosion Engineers, south central region, Roosevelt Hotel, New Orleans.

22-23 National Association of Corrosion Engineers, western region, corrosion control course, U. S. Grant Hotel, San Diego, Calif.

22-24 Southwestern Federation of Geological Societies, technical meeting, Mineral Wells, Tex.

22-24 Society of Automotive Engineers, national diesel engine meeting, Lord Baltimore Hotel, Baltimore.

23-24 Rocky Mountain Oil and Gas Association, annual fall meeting, Town House Motel, Omaha.

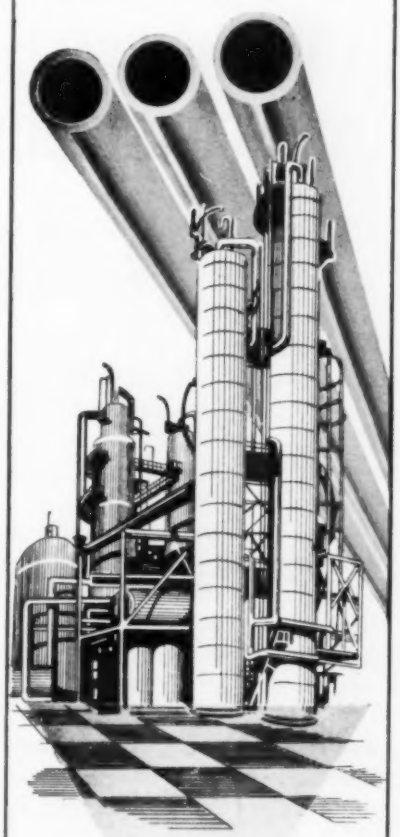
23-24 Western Petroleum Refiners Association, refining technology and industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

27-28 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

26-31 American Institute of Electrical Engineers, general meeting, Pittsburgh.

Pipe & Tube

For Oil & Gas Industries



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Foremost producer of steel pipe and tube of all types

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(Japan Steel & Tube Corporation)

Ohtemachi, Chiyoda-ku, Tokyo

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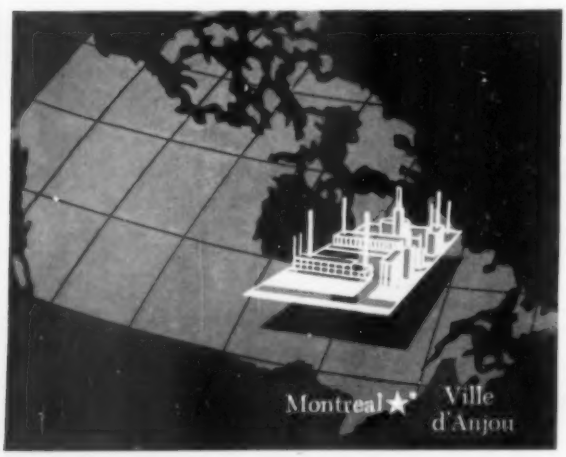
LUMMUS COMPANY CANADA LIMITED TO ENGINEER AND CONSTRUCT 25,000 B/D COMPLETE REFINERY

New Installation for BP Canada Limited Planned for Completion by the Middle of 1960

The Lummus Company Canada Limited has been announced as the successful contractor by BP Canada Limited to engineer and construct the new 25,000 B/D BP refinery at Ville d'Anjou, near Montreal, P. Q., Canada.

The basic process units will consist of a crude distillation unit with a total charge of 25,000 BSD, a distillate treatment unit with a charge of 12,000 BSD, a catalytic reforming unit with a charge of 6,000 BSD, and a catalytic cracking and polymerization unit with a fresh feed charge of 9,000 BSD.

In addition, the refinery will contain a wharf and transit site for the receipt of feedstocks and the dispatching of products by tankers, and a pipe route connecting the refinery to the wharf and transit site. There also will be road and rail distribution facilities for products, necessary tankage, utilities and buildings, and fire fighting facilities. The refinery will be laid out in such a way as to permit future expansion double that of the original capacity.



The refinery is being designed by The Lummus Company Canada Limited to produce primarily 400,000 tons per year of gasoline, and, in addition, aviation turbine fuel, stove oil, diesel oil, and other products. Preliminary work on the site and on a three mile pipeline to the St. Lawrence River is already under way.

BP Canada Limited, with its executive office in Montreal, is the subsidiary of British Petroleum Company Limited, conducting marketing operations in Canada. It is understood that another BP company is being formed to own and operate the refinery.

The refinery at Ville d'Anjou will be the twentieth complete refinery engineered by Lummus throughout the world since the end of World War II. For design, engineering and construction of refineries anywhere in the world—Lummus' over fifty years of world-wide experience on over 700 plants for the process industries is at your disposal.

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JOURNALLY SPEAKING

Shake, Sheikh

SO IT'S AGREED. The Arabians will attend the Tulsa Oil Show next spring.

That's the word of one ambassador to another: His Excellency Sheikh Abdullah Al-Khayyal, Ambassador of Saudi Arabia, and Envoy Extraordinary Dr. Oscar B. Irizarry, Ambassador of the International Petroleum Exposition.

Oscar is the one on the right. In private life he is editor of Petroleo Interamericano, the Journal's sister publication for the palm-fringed oil lands to the south. But every time an oil show is scheduled, the officials of the IPE fix Oscar up with an appointment as their special envoy, a commission as colonel on the staff of the Governor of Oklahoma, and other impressive credentials, and send him forth to all the high places of Oildom to deliver special engraved invitations to the VIP's.

The show won't be until next May 14-23, but it will commemorate the centennial of the petroleum industry and already the equipment companies have signed up for most of the exhibit space available. So Advance Agent Irizarry has already hit the road.

His first calls were in Washington, where he presented invitations to (and had his picture taken with) the chiefs of mission of all foreign oil-producing countries and also the top brass of all U. S. Government agencies having anything to do with oil and gas.

Come fall, Envoy Irizarry will make a personal visit to every Latin American oil-producing country to display his persuasive charms and elaborate invitations to assorted Jefes de Estado, Ministros de Fomento, ruling juntas, and other appropriate officials.

It's nice work, if you can get it. Oscar gets it every oil show, not only because he speaks Spanish like a native (native of Puerto Rico, that is) but because of his professorial dignity and editorial aplomb.

All these dignitaries may not attend in person, but if the oil show isn't heard of around the world it won't be the fault of the IPE's El Señor Ambassador.

—Henry D. Ralph

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The outlook calls for optimism with caution

As the oil industry winds up a sorry first half year, guarded optimism is in order for the second half.

Thanks to drastic cuts in allowables and a firmed-up import policy, stocks of crude east of California are some 14 million barrels below last year and are down to about a good working level. Buyers describe the crude situation as snug, with no distress stocks and only the less desirable crudes seeking a home in sizable quantities.

Product stocks are not in quite as good shape. This is due in large part to the drop in industrial demand for heavy fuel oil, but here again the bulk of the excess of resid stocks is in California. Gasoline and distillate stocks, while a little under last year, are still a bit on the high side in the light of anticipated consumption.

FORECASTS ARE THAT DEMAND for all petroleum products during the third quarter will be practically the same as the third quarter of last year. Lower exports will be offset by a slight increase in domestic consumption. Imports should stay about where they are.

For domestic producers this indicates an output about 100,000 bbl. per day above the third quarter of 1957, or in the neighborhood of 600,000 or 700,000 bbl. per day above the average of the past 3 months. And most of this increase should be east of California.

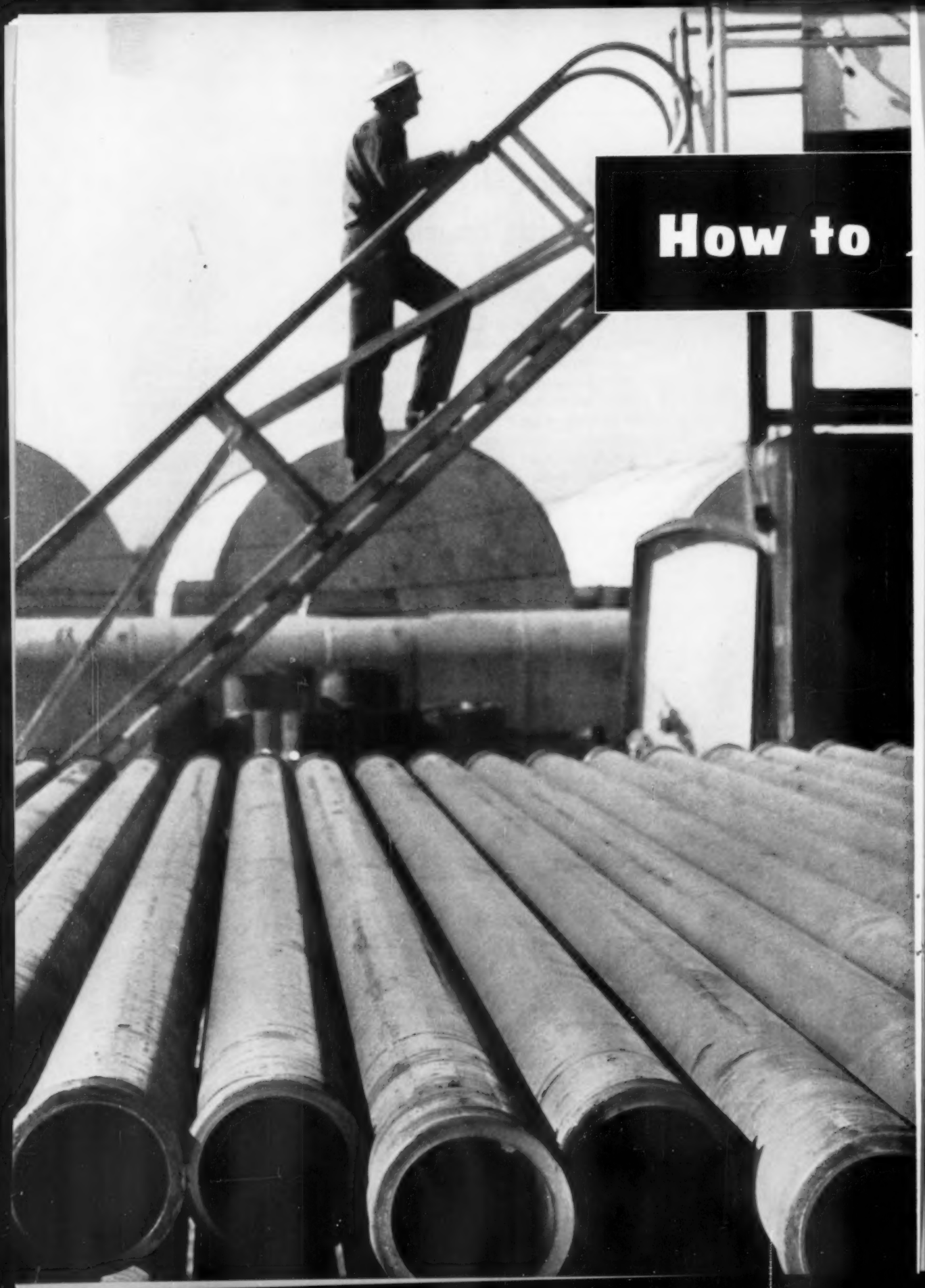
This is a heartening outlook, but it must be tempered with caution. The increase should be spread through the quarter, with a constant eye on demand and stocks. Otherwise there could be a repetition of the third quarter of 1956, which set an all-time record for inventory increase and headed the industry for disaster which was avoided only by the Suez shutdown.

Nor should any one state or area try to hog an undue share of this production increase. Unless the increased production is evenly spread there will be local surpluses, rearrangement of transportation schedules, and some crudes without a home. The problems of unconnected wells, selective buying, and purchaser proration would be aggravated just when there is a good chance to alleviate them.

REFINERS SEEM IN EVEN GREATER DANGER of letting their optimism run away with them. The increase in runs the past 2 months has been abnormally sharp.

The big jump in runs is hardly justified either by the very slight stiffening in market prices or by the moderate decline in gasoline and distillate stocks. Product stocks are still too high for comfort.

Certainly the industry is in better shape for the third quarter than during the first two. But all elements should remember that the improvement is moderate and relative. Too much optimism could easily upset the present delicate balance.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9-Day Allowable to Give Texas a Lift

• Most buyers want more, but producers go along with the modest raise. Chairman Culberson lashes hard at "unrealistic" nominations and lack of new well connections, says stock figures not related to buying habits.

TEXAS producers in July will get their first substantial oil allowable boost since February.

The Texas Railroad Commission last week fixed a 9-day pattern for July. This will mean an initial allowable of 2,604,798 bbl. daily—up 125,624 bbl. from the initial figure for June and a gain of 133,082 bbl. over that in effect June 7.

In the process, Commission Chairman Olin Culberson whammed away hard at major crude buyers for "unrealistic" nominations and reluctance to take on new connections. His statement followed 3 weeks of sifting through data on stocks, spot buying, and well connections solicited from the buyers at the allowable hearing in May.

Though still on the anemic side, the 9-day July allowable looks good to Texas producers who by month's end will have subsisted on a near-starvation diet of 8-day allowables for 3 months.

With stocks still falling and demand picking up, some producers now are hoping that July will be the beginning of a mild comeback and that the leanest days are over.

Though still cautious, producers generally advocated an allowable increase to 9 days. This is a switch from their policy at the past three hearings when they fought to hold allowables to 8 days so as to reduce stocks and find markets for producers in distress areas of the state.

Not enough for buyers . . . Major crude pushed harder for increased production in July. And a majority of them wanted more than they got. Only five (Gulf, Conoco, Sun, Atlantic, and Phillips) recommended 9 days.

Shell, Indiana Oil Purchasing, and Sinclair wanted 10. Magnolia and Humble sought 11. Texaco asked for 12, and Standard of Texas wanted to go all the way to 13 days.

Humble told the commissioners its stocks are now below what it considers minimum working levels. Even on an 11-day pattern, Humble said, it would still have to go out and buy at least as much spot oil in July as it is buying in June.

Texaco fought strongly for 12 days arguing that stocks east of California now are 9,000,000 bbl. below desired levels. Texaco's J. C. Edwards told the commission his company had to cut refinery runs 30,000 bbl. a day in June due to a shortage of crude.

Culberson's findings . . . In a lengthy statement read at the hearing, Culberson said the commission study of data submitted by the purchasers tends to confirm that:

. . . Nominations perhaps are becoming increasingly unrealistic.

. . . There is no adequate basis for deciding when crude stocks are actually surplus. And stock figures are capable of "manipulation."

. . . No discernible correlation seems to exist between a company's stock position on the one hand and its nominations, willingness to make spot purchases, and policy with respect to connecting wells on the other.

. . . There is need for a more direct way of assuring ratable oil take from each well in Texas than by setting allowables below purchaser nominations.

. . . Connecting of new wells to pipelines is proceeding at a snail's pace.

ALLOWABLE BY DISTRICTS

District	July	Increase from June 7
1—Southwest	52,844	1,476
2—Gulf Coast	101,623	6,300
3—Gulf Coast	372,422	15,305
4—Southwest	183,675	9,218
5—East Central	30,194	1,322
6—Outside East Texas field	107,382	6,125
6—East Texas field	130,145	8,505
7-B—N. Cent. Texas	152,469	6,586
7-C—W. Cent. Texas	134,521	9,058
8—West Texas	955,005	56,896
9—North Texas	245,185	10,783
10—Panhandle	139,333	1,508
Total	2,604,798	133,082

Stocks and allowables . . . "With respect to aboveground stocks," Culberson said, "recent events have confirmed what we have long suspected: There still is no adequate basis for deciding when stocks are actually surplus.

"For example, total aboveground stocks of both crude and products remained above the recommended level through the Suez crisis when we were repeatedly told that there was a desperate need to increase allowable production.

"Additionally, we have seen instances where crude of Texas origin showed an increased stock position even while drastic curtailments were made in Texas production. This illustrates simply that stocks are capable of manipulation to serve the momentary wishes of the manipulators."

On the basis of "fragmentary" information supplied in answer to the commission questionnaire, Culberson said, it would appear that stock positions of reporting companies for Districts 1-4 are somewhat below desired levels. These, he said, range from 93,000 bbl. to 2,000,000 bbl. below desirable levels.

Of 15 reporting companies, only 3 had excess crude in storage. Of those importing firms reporting, Culberson said, five indicated a total underage in stocks of 1,000,000 bbl., two had excess stocks of 3,200,000 bbl., one reported normal stocks, and one figured them "somewhat low."

"It would seem clear then that there

What Texas companies say about . . .

Stocks, Spot Purchases, New Connections

Company—	Stocks East of California	Spot Purchases Since Jan. 1	Connections Made Jan.-April
Atlantic Refining Co.	500,000 bbl. below desirable	13,000 b/d, Jan. 1-June 1	13 thru April
Cities Service	7.5% below desirable	100,000 bbl. during May	40 pipe 5 truck
Continental	Normal	6,000 b/d through May 21	10
Cosden Petroleum & Costex	At or below normal	From other purchasing companies only	14
Gulf	1.75 million barrels excess	None	40
Humble	"Minimum operating levels"	4,000 b/d, April 7,500 b/d, May	144
Indiana Oil Purchasing Co.	2 million barrels below	9,500 b/d, April 7,900 b/d, May	95
Magnolia Petroleum	400,000 bbl. below desired	35,000 b/d, Jan.-May	45 pipe 33 truck
Phillips	At "very desirable" levels	6,300 b/d, April 13,500 b/d, May	32 pipe 66 truck
Shell	Crude 93,000 bbl. below	93,600 through May	174
Sinclair	"Somewhat below" desirable	8,500 b/d, March-May	113
Southern Minerals	375,000 bbl. surplus	None	11
Standard of Texas	470,000 bbl. or 44% of desired level	10,500 b/d, avg., Feb.-May	1
Sun Oil	1.5 million barrels excess	30,000 b/d, Feb.-May	18
Texas Co.	Normal, but expected low by June 1	22,000 b/d, May	66 pipe

is little or no valid basis for assuming that the stock position of these companies is of itself sound grounds for either raising or lowering allowables. Our annual requests for purchaser recommendations as to desirable stock levels may need reexamination."

Connections and spot purchases . . . Furthermore, Culberson said, a purchaser's stocks position seems to have no bearing on its nominating, spot purchasing, and well connecting activities.

"For examples, seven companies indicating lower than desirable stocks made spot purchases in May of a total of 78,100 bbl. per day. Three companies reporting excessive stocks bought a total of 30,000 bbl. a day in May. And five companies reporting normal stocks bought a total of 49,000 bbl. a day in May.

Importing companies are buying from 648 additional wells since the start of the year, at least 104 of them via trucking arrangements (some reporting firms failed to designate whether oil was being taken by truck or pipeline).

"Companies indicating lower than desirable stocks (five of them importers) made 519 new well connections (85 pipeline, 38 truck, 396 undesignated). Importing firms with stock levels lower than desired bought from 420 new wells (85 pipeline, 35 truck, 300 undesignated).

"Atlantic Refining, with reported stocks of 500,000 bbl. below desired levels, connected only 13 wells. Gulf, with stocks of 1,750,000 bbl. in excess of desired levels, connected 40 wells. Standard of Texas, with stocks standing at only 44% of desired levels, connected only one well, while Sun, with stocks of 1,500,000 bbl. in excess, connected 18."

Concerning spot purchasing, Culberson pointed out that Indiana Oil Purchasing bought only 7,900 bbl. daily in May despite its stocks being 2,000,000 bbl. low, while Sun, with 1,500,000 bbl. too much crude, spot bought 30,000 bbl. daily.

Ratable taking and allowables . . . The commission in the past, the chairman said, had justified setting allowables below nominations mainly on grounds that such action was necessary to prevent selective buying in such extreme forms as purchaser proration.

"This is based on the theory that each well and each producer in the state can be assured an equitable share of the market by reducing the total supply. . . .

"I believe the time has now arrived to reexamine this theory.

"So long as imported oil and supplies from other states remain relatively unrestricted, there is likely to exist a surplus so great as to defy achievement of equity on ratable taking through this concept of market demand proration."

Withholding connections? . . . "It seems clear that most of the purchasing companies are withholding connections of new wells—at least until it is determined whether Congress is actually going to provide more effective import curtailment.

"Well connections are proceeding at a snail's pace. While oil completions this year through May 31 total about 5,700, reporting companies show they are taking oil from only 910 new wells."

The purchasers prefer to buy trucked oil rather than to connect the wells to their pipelines, Culberson said, because "this leaves them in the economically advantageous position of taking the oil when and if they want it . . . which is to say, if cheaper imported oil is not available in adequate quantities."

New lease connections . . . Culberson cited lease connection figures which showed that purchasers have connected 738 new leases this year through April as compared with 1,371 new leases placed on commission books during the same period.

In Texas areas suffering most from the unwanted-oil problem (Districts 7-B, 7-C, 8, 9, and 10), companies reported 552 lease connections as compared with 1,002 new leases on the commission books.

BEING TOWED from Long Beach Harbor to its offshore site is the tower for California's permanent drilling platform.

Tower Anchored Off California Shore

STANDARD OIL Co. of California last week successfully lowered a huge steel tower in 100 ft. of water 2 miles offshore from Summerland. The tower will be part of California's first permanent-type drilling platform.

Though it was the first time a structure for a platform was placed in position in one piece, the operation was performed without a hitch.

Standard of California, operator on the 5,500-acre state lease it jointly holds with Humble Oil & Refining Co., then started putting the outer caisson-equipped legs into place.

After the 167-ft. high tower is securely anchored to the ocean floor, the 110-ft.-sq. prefabricated drilling superstructure will be lifted into place.

Double duty . . . The platform is designed for 25 producing wells. By using a novel 140-ft. derrick with two rotaries and draw works, wells can be drilled two at a time. Initially drilling will be carried out on a one at a time basis. Goal for starting the first well is before August 1.

Key tool in the lowering operation was a 90-by-300-ft.-barge equipped with a 250-ton crane. This stabilized the tower while buoyancy of the caissons was adjusted so that the tower sank slowly (OGJ, June 9, p. 111).

The huge barge next will be used to place the drilling deck and equipment on the tower. The barge then will have served its usefulness. This will be only a temporary condition, however, since Standard of California has plans for two similar platforms.

Outlook promising . . . That a new offshore field soon will be "discovered" at Summerland is indicated by production equipment built into the platform at the time it was barged northward from Long Beach Harbor. Separators, meters, manifolds, and other flow equipment for 25 wells will be in place before drilling of the first well is started.

After being granted the lease in January 1957, Standard of California carried out an extensive core-drilling program from its floating drill barge. Two wildcats then were drilled from a Gulf-type mobile platform. Standard of California has not revealed their findings.

Drilling operations . . . Drilling from the permanent platform will be done under contract by Western Offshore Drilling & Exploration Co.

There will be no quarters on the platform for contractor's crews, except on an emergency basis. Crews will be changed on an 8-hour-tour basis, using a helicopter for transportation unless foggy weather makes flying dangerous. The heliport will be cantilevered over the side.

The costs of the drilling operations will add to the multimillion-dollar investment Standard of California and Humble started in January 1957 by paying the State Lands Commission a bonus of $7,250,000 for the 5,500-acre parcel.

The big bonus paid by Standard of California and Humble is an indication of the value oil men place on California's tidelands.

A Top Venezuelan Moves to the U.S.

Dr. Siro Vazquez sets a precedent as he steps into Jersey's top echelon.

He's a production expert up from the ranks, a hard worker, and he handles a New York press conference like a veteran.

Paul Swain
International Editor

Dr. Siro Vazquez
World-wide coordinator of production for Standard Oil Co. (N. J.)

TWENTY-ONE years ago a young Venezuelan petroleum engineer left a secure government job as petroleum field inspector and went to work for Dick Kester, the Quiriquire superintendent for the old Standard Oil Co. of Venezuela.

Kester habitually showed up at the office at 5:30 a.m. That meant just one thing to the ambitious fledgling engineer—he belonged in the office at 5 a.m.

If Kester were still in the same job today, he'd be taking orders, indirectly, from the engineer who beat him to the office by 30 minutes.

Dr. Siro Vazquez has not only passed a personal milestone; he has also stepped into a unique position with the world's largest oil company. He recently was named producing coordinator for Standard Oil Co. (N.J.). It's not unusual for a top production man in one of the Jersey affilliates to fill this post, but this is the first time a Latin American has been tagged for the job.

People around Jersey's New York headquarters say Dr. Vazquez would have had the top post if he came from Outer Mongolia, but it's difficult to ignore the implication involved in naming a Venezuelan to the job at a time when all Latin America feels that the U.S. is looking too much to the east and west and not enough to its neighbors on the south.

Last week, even before his new office in Jersey's New York headquarters at 30 Rockefeller Plaza had been prepared for him, Dr. Vazquez successfully faced what could have been an unnerving experience for any successful industrialist—a full-fledged New York press conference.

He came through with flying colors, answering questions candidly, seriously, and demonstrating his ability to field and handle queries he didn't think he should answer. He talked with obvious affection and regard about Venezuela and its place in a mixed-up oil world of today, but he studiously avoided comments with any political implications.

"I've always avoided becoming involved in politics, and I work for a company which has never been involved in internal politics in a country in which it operates, so I must always keep this in mind," he says seriously.

What he's like . . . A tall, quiet individual with a thinning hairline, Vazquez is equipped with a pair of pale blue-gray eyes that give the impression of being penetrating.

His normal expression is rather serious, but his face breaks readily into a slow, wide smile which indicates he's not all serious. He's articulate and his English is impeccable. Only his Latin accent betrays his origin.

When he talks of the world's economic problems, oil in particular, of his native country, or of his new responsibility with Jersey, he's inclined to be all seriousness. He has an intensity that gives an insight into what carried him to the spot he now occupies.

"I made up my mind when I first went to work for Standard Oil of Venezuela (the predecessor of Creole Petroleum) that I was going to work harder than anyone else in the company," he recalls very calmly. (Young Jersey engineers might take note.)

"At that time we had six rigs running, each completing a well about every 20 days, and there was plenty to do, a lot of drill-stem tests to run, and other things. During those days I spent most of my nights as well as my days in the field."

With a slow smile he likes to recall one incident of those days in Quiriquire.

Here's What Vazquez Says on Top Issues

Venezuela:

"It would take more insight than any human being has to predict Venezuela's future. She is a nation fighting to develop her political and economic future. She has a very good chance to succeed. As a good citizen, the country has all my sympathies in every way."

50-50 Formula:

"The basic 50-50 formula as we know it today has made every great oil producing country in the world today. All producing countries, today and for many years, will be competing for markets. The 50-50 profit split formula has been eminently successful for both the oil companies and the countries in which they operate.

"Under this tested formula Venezuela received more than $700 million in bonuses for new concessions in the last 2 years. These bonus funds help a producing country like Venezuela diversify what is the one-economy situation in most of the big oil producing countries of the world.

"The Pan American contract with Iran has attracted a lot of attention recently and has been called a 75-25 contract. It is basically a 50-50 contract. Iran is only investing its bonus in its own industry instead of making an attempt to diversify its economy with bonus funds. It will take a long time to tell whether or not Iran is wiser to take this step or to do things the other way."

Existing Concession Contracts:

"Whether there is a basic change in future concession arrangements in the world or not, I feel that existing contracts will be honored by the producing countries.

"Venezuela has respect for its contract obligations. Middle East people are honorable people. I think they will honor their contracts, too."

Venezuela's Own National Oil Company:

"A national oil company for Venezuela which would collaborate with private industry—not organized in competition with it—is a real possibility for Venezuela in the future. Many people in Venezuela think it would be a good thing. Personally, I have reservations."

Anti-Nixon Riots:

"The violence shown Vice President Nixon on his recent visit to Caracas has absolutely no connection with oil in any way. The majority of the Venezuelan people heartily regret what happened and repudiate the actions of a small group of radicals who were responsible."

Dr. Vazquez added that a "great many" factors entered into the emotional outburst against the U. S. official. Among them, he conceded, were oil import restrictions imposed by the United States, but he emphasized that this was only one of many things used by the radicals to spark the violence.

He said criticism of Venezuelan police for not retaliating is not well considered.

"It was all over in a very few seconds. If the authorities had used force after the violence was over, it would have meant killing people. If that had happened, it would have become a much more serious incident than it was. It was regrettable enough."

U. S.-Latin American Relations:

"There has been a great deal said lately about the United States 'neglecting' Latin America. I, frankly, do not know whether this is true or not. There is a question of priority involved in handling as many world-wide problems as the Government of the U. S. has today.

"I do know that the U. S. side of the problems and the news is not being effectively put over to the public in Latin America. The other side of everything is well distributed for public consumption. A great many issues are raised contrary to the interests of the U. S., but none are ever refuted.

"This question of 'neglect' of Latin America is raised in your own press and then is circulated in Latin America. Nothing is said to refute any charge that Latin America is being neglected, if it is."

Import Controls:

"There are very important and sincere points of interest on both sides of this question. Venezuela doesn't like the restrictions. Venezuelans feel they have been friends of the U. S. through thick and thin, and they have made their oil available to the U. S. during times of great stress when it was needed. They feel they should be assured a stable market for their oil now.

"On the other hand the U. S. producer is carrying a very serious economic burden. It has all been brought on by the Suez crisis. Free trade will prevail in the long run. In the meantime we have a temporary solution (voluntary restrictions) that no one cares for, but one which is working."

International Proration to Cure Oversupply:

"I sincerely hope this is never necessary. It is up to private enterprise to act with judgment to solve its oversupply problems.

"If it comes to a question of weakening oil prices to a point that is not economic, well (with a shrug), we live in a competitive world. We'll just have to face that kind of a problem in a competitive way."

"I walked into the mess hall one day, covered head to foot with mud and grime, when Henry Linam, president of the company, was there with a party of influential visitors from Caracas.

"Mr. Linam called me over and introduced me to his party—some of whom I knew—and then called me aside and said, 'Kester tells me you're working too hard. That's fine, but don't kill yourself'."

It's clear from his obvious pride in telling the story that Vazquez was determined to do his job from the start with the firm knowledge that such industry would be noted and appreciated. He recommends the same philosophy to any and all young men today.

His climb . . . The real turning point in his career with Jersey came 2 years later, Vazquez believes. He was assistant chief engineer in the Caripito division office when there was another group of distinguished visitors.

"We had discovered a substantial number of new fields, and I had been deeply involved in the very early reservoir engineering and plans for development of the new finds."

Wallace Pratt, former chief geologist for Jersey, and Pete Lieb, who was then Jersey's coordinator of production (the job Vazquez now holds)

visited the Caripito division office.

"They wanted to know about our plans for development of these new fields. With the help of the rest of the engineers on the staff, I was able to outline in great detail just what we had learned about all the fields and our plans for each one of them. Of course, those plans have changed many times since then, but we knew what we thought should be done and in detail.

"The whole engineering staff of the district, and I along with it, gained new stature as a result of this."

From this point on, the Vazquez climb up the ladder is almost traditional. He was named chief engineer, then assistant production manager for Creole, and later production manager. He became a director of Creole, one of Jersey's most important producing affiliates, in 1953. He left the Creole board to join the parent company when his predecessor, M. A. (Mike) Wright, became a member of the Jersey board last month.

His education . . . Vazquez graduated from the Central University of Venezuela in Caracas, his birthplace, as a civil engineer in 1930.

Then he moved north to the University of Tulsa where he not only acquired a degree of bachelor of science in petroleum engineering, but a wife as well. While a university student, he met Claire Duff, a native of Greensburg, Pa., who grew up in Tulsa. Today they have four children.

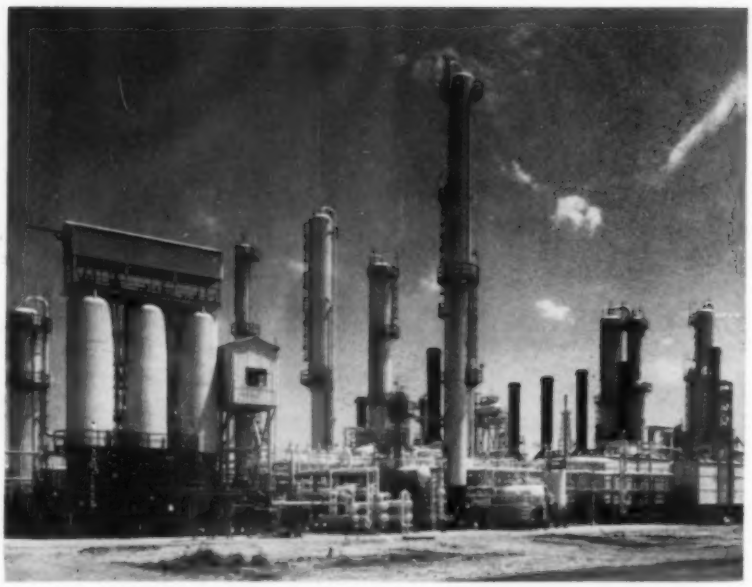
He spent 4 years as a petroleum inspector for the Venezuelan Government in the Quiriquire area before joining Creole's predecessor company as a district engineer in 1937.

His opinions . . . For a man who has so recently stepped into a new realm, a new responsibility on a world-wide basis, and a new life, Dr. Vazquez can be very candid in his views, which are founded obviously on a great deal of reflection (see box, p. 73).

Furthermore, he does not feel that his experience with Creole is in any way confining, now that his is faced with a world-wide responsibility with the world's largest oil company.

"I kept well informed with Creole," he comments with a slow smile. "After all, anything that happened in oil anywhere in the world was vital to Creole."

He doesn't even "know the department" in Jersey, but he gives the impression he'll learn pretty fast. Last week, after less than 2 weeks in company headquarters, Vazquez caught a plane in the first of his many travels. He is attending a European production conference this week in Europe.



High-Octane Expansion Is Completed

PRODUCT QUALITY—meaning gasoline octane exceeding 105—is the sole objective of a $12-million expansion dedicated last week at D-X Sunray Oil Co.'s Tulsa refinery.

The expansion doesn't add a gallon to the plant's 75,000-bbl. capacity. But it puts the company in the position of being able to meet superhigh octane requirements when future cars need them, according to Harry A. Brown, manufacturing vice president.

Four new units help with the job. A 20,000-bbl. naphtha Unifining unit pretreats feed for the new 12,000-bbl. Platformer as well as the existing 7,500-bbl. unit. The new set-up includes a reformate rerun tower for preparation of selected blending stocks.

The 2,400-bbl. butane isomerization unit serves the new 2,500-bbl. HF alkylation plant which can turn out 105-octane or higher blending stock for use in motor gasolines. Two all-electronic control rooms serve these four process units. Of Universal Oil Products Co. design, they were completed in 13 months by The Refinery Engineering Co.

Shown here are the three reactors of the isomerizer, left, the Platformer, center, and at the right, the Unifining unit.

Onassis in Hot Water Again

THE ONASSIS shipping interests are again battling a storm whipped up by the federal Government.

They found themselves involved last week in the second congressional inquiry of the past year into their dealings with the Government. At the same time they were served with a suit brought by the Justice Department as a result of an alleged breach of contract.

The new troubles of the tanker empire ruled by Aristotle S. Onassis arose when orders were canceled for three new tankers which were to have been built under a settlement of a previous suit (OGJ, June 16, p. 78).

The House merchant-marine committee opened hearings to find out how the Government was planning to protect itself. And a few days later the Justice Department filed a multimillion dollar recovery suit in the New York federal District Court.

The Government suit calls for action by the court in any one of three ways:

. . . It seeks the forfeiture of 14 vessels which Onassis was permitted to transfer to foreign-flag operation in return for the building of the three new vessels, and recovery of the net profits from their foreign-flag operation.

. . . As an alternative, the court was asked to force the Onassis group to make good on the contract to build the ships before the fall of 1960.

. . . A second alternative asked for $8 million in damages—the difference between the estimated value of the

14 vessels under American-flag and foreign-flag operation.

The government suit cited the Grace National Bank of New York as guardian of a trust set up by Onassis to build the new ships. It also named the Alexander S. Onassis Corp., a Liberian company, and Victory Carriers, Inc., an American firm.

Criticized at hearing . . . A review of the Maritime Administration's relations with the Onassis interests drew fire from the House committee at the opening of its probe.

The MA is more interested in getting new American-flag tankers than in seeing the government collect damages, Administrator Clarence G. Morse explained.

For that reason, he said, he gave tentative approval to a plan to substitute two tankers building for foreign flag for two of those which were to be built for U. S. registry.

Morse was criticized, however, for even having talked about the matter with Onassis and for not having disclosed to Capt. Granville Conway, president of Victory Carriers, that the deal would have to be approved by the committee.

Morse said the latter was an oversight. And he talked with Onassis, he said, because the shipping magnate was an interested party, both as a minority stockholder and as the father of the children for whom the trust was set up.

Line Contracts Let

to Zachry and Shanks firms for King Ranch gas system.

HUMBLE Oil & Refining Co. has let contracts for two pipeline projects which will form part of its King Ranch gas-gathering system.

H. B. Zachry Co., San Antonio, has the contract to lay 37 miles of 24-in. line and H. S. Shanks & Sons, Alice, for 47 miles of 12-in. Both projects are in the Falfurrias area of Southwest Texas.

The King Ranch system will gather gas from several shut-in fields and deliver it to Humble's proposed cycling plant to be built in Kleberg County near the company's Seeligson compressor plant.

The cycling plant, with a capacity of about 750,000,000 cu. ft. per day, will be the world's largest (OGJ, June 10, 1957, p. 63). Construction of the plant is expected to start late this year.

Humble also has disclosed tentative plans for a 26 or 30-in. line to move gas from Southwest Texas to the Houston-Beaumont-Baytown area.

watching WASHINGTON

. . . with Bertram F. Linz

• Hussey gives senators his views

THE NEWEST member of the Federal Power Commission is opposed to utility-type regulation of natural-gas producers.

John B. Hussey appears to hold the same views on federal control as retiring Seaborn L. Digby, whom he will succeed this week. The two have the same background. Both came to the FPC from the Louisiana State Conservation Commission.

Hussey gave his ideas on producer control before the Senate commerce committee in the preconfirmation hearing given all presidential appointees.

He does not object to regulation on a just and reasonable formula. But cost-base price fixing will not work because the producer has just so much gas underground and no way of increasing it. The FPC hasn't yet been able to write a formula which could be applied in all cases.

While against utility control, Hussey declined to take a position on amendment of the Natural Gas Act. That is a matter for Congress to decide, he pointed out. As an FPC member he will have to carry out the law, as it stands now or as Congress may change it.

• Naval spending at Long Beach may stop

CONGRESS is putting pressure on Long Beach to deal quickly and effectively with the subsidence problem which threatens government and industrial installations in the area.

Chairman Carl Vinson (D-Ga.) of the House armed services committee is willing to spend the money needed to repair damage at the naval shipyard. But he insists that the community must see that everything possible is done to check subsidence. Long Beach early this month approved a $23.5-million program to fight subsidence (OGJ, June 9, p. 71).

The committee has tentatively approved the spending of $6 million on the shipyard. But it says that $5.5 million is to be held out unless the Secretary of the Navy finds that sufficient action has been taken or arranged locally to handle the problem.

The Long Beach situation may eventually lead to other action by the Government. The Justice Department has been watching it for some months. There has been no indication that it will base a suit on the subsidence in the near future, however.

• Oil has a stake in big water program

THE INTERIOR Department plans to spend $10 million in finding the cheapest way of making something drinkable out of salt water.

Scientists warned 10 years ago the U. S. is heading toward a national water shortage that will be serious in many areas by 1980.

That's of some importance to the oil industry, which needs fresh water for drilling mud.

Congress ordered a study of the problem in 1952. Since then researchers have been seeking the best way of making usable the sea water off the coasts and the brackish waters in the interior.

It's no trick to take the salt out of water. At least a half-dozen ways have been found.

An efficient method was developed for the military in the last war. It is being used increasingly by industry. Some 20 offshore oil rigs on the Gulf Coast are equipped to desalt sea water. It's rather costly, however. They would like to get a cheaper process.

Firms Say "No" to Union

. . . in negotiations so far this year. Sinclair-OCAW contract talks broken off when company refuses demands.

THE OIL, Chemical and Atomic Workers International Union is stymied in its efforts to gain 1958 wage and other contract improvements from the oil industry.

Not one of the oil companies, employing a total of 105,000 OCAW members, has accepted the union's bargaining program or made any counter proposals since the campaign was launched 4 months ago.

"We have not received a single offer," a spokesman at union headquarters in Denver said.

Latest to stamp an emphatic "No" on the union's proposals was Sinclair Oil Corp. Five days of negotiations between Sinclair and OCAW broke off June 13 in Kansas City without an offer by Sinclair on any major demand of the union.

OCAW represents 9,000 members employed in Sinclair pipeline, production, refinery, and research operations.

All other companies either have rejected the OCAW contract goals outright or have indicated rejection by remaining silent.

What next? . . . Strike votes among locals may be the next step in OCAW efforts to get higher wages for its members.

If such votes are taken and are affirmative, they will give union officials a weapon to enforce their demands. These demands were served on Sinclair at the Kansas City meeting. They were unequivocally rejected by William E. Stone, Sinclair vice president in charge of industrial relations.

Demands on Sinclair . . . OCAW had asked Sinclair for a 36-hour work week with no cut in take home pay, plus the general mandatory program adopted by the union's bargaining policy committee last February.

Included in this program are a cost-of-living wage adjustment and an annual 3½% productivity increase. The wage proposals add up to approximately 19 cents per hour. Sinclair also was asked to make improvements in sick, accident, and pension plans. These plans expired June 14 but were extended automatically when negotiations broke down.

Sinclair's reply . . . Stone turned down the union flatly on its demands.

"In the face of the anomaly of high volume and declining profit margin resulting from increased costs—especially labor cost in all its forms—this is no time to consider hiking wages and boosting costs even higher," Stone said.

Sinclair contends that neither the cost-of-living theory nor the productivity theory is valid. If company wage rates remain stable, the company says, and the consumer price index continues to increase 3% annually as it has for the past 10 years, it would take more than 20 years for the cost-of-living to catch up with Sinclair workers hourly wage gains.

As for productivity, Sinclair says that over the last 18 years Sinclair hourly wage rates have gone up 180% on the average while the long-term national productivity trend increased only 54% in the same period.

Sinclair cited its contract with the union as the basis for turning down the request to reduce hours to 36 per week but to keep weekly wages at their present level. The contract prohibits the union from singling out Sinclair for shorter hours and specifies that such an objective must be sought on an industry-wide basis.

The contract permits either party to initiate negotiations. Since Sinclair's refusal to yield adjourned the Kansas City meeting, it is almost certain that if talks are to be reopened, the union will have to take the first step. A strike vote could be a preamble to a resumption.

The big one . . . OCAW's master contract with Sinclair is the union's only nation-wide agreement in the oil industry. Although it runs until June 14, 1959, the contract was reopened this month under a provision allowing mid-term negotiations on wages and hours.

All other oil industry bargaining is on a plant-by-plant basis.

The termination of talks June 13 was subject to call by either party or, as OCAW said, "by the federal conciliation service."

This U. S. Government agency normally does not intervene in labor disputes unless a strike is imminent.

When the union encountered a similar impasse in 1957 the bargaining policy committee was called back in to emergency session. The group scaled down the 27 cents an hour it had prescribed and contracts were settled generally in mid-May for 6%. OCAW said last week the committee has not yet been summoned to meeting this year.

The average wage in the oil industry is $2.70 per hour.

Crude Prices Cut in Two Areas

PRICE CUTS from 10 to 25 cents a barrel have been posted on crude purchased in two widely-separated points of the nation.

The 25-cent cuts are on Pennsylvania Grade crude purchased by South Penn Oil Co.

Union Oil Co. of California reduced prices 10 to 13 cents a barrel on crude purchased from the Four Corners area.

Joseph Seep Purchasing Agency for South Penn posted these new prices:

Bradford district oil in Bradford Transit Co. and National Transit Co., $3.90; Middle District grade oil in National Transit, $3.72; Pennsylvania Grade oil in National Transit (southwest division), $3.43; and Pennsylvania Grade oil in Eureka Pipe Line Co., $3.25.

There was no change in prices for Allegany, Buckeye, or Zanesville Pennsylvania grades.

Union's new price . . . Union's cuts apply to crude of 36° gravity and above from Aneth, Ratherford, White Mesa, and McElmo Creek fields in San Juan County, Utah.

The new posted price shows a 13-cent decrease for all of 36-36.9° gravity—from $2.82 to $2.69—with the 10-cent cut for crude of 40° and above.

Instead of the 2-cent differential for each degree upward to 40° in their old price list, Union posted a 3-cent differential in its new prices, with one exception.

Union's new prices, with the old price in parenthesis: 36-36.9°, $2.69, ($2.82); 37-37.9°, $2.72 ($2.84); 38-38.9°, $2.75, ($2.86); 39-39.9°, $2.77, ($2.88); 40° and above, $2.80, ($2.90).

Union's new prices range from 30 cents to 38 cents lower than those posted in April by Shell Oil Co. for crude purchased in the Four Corners area.

Shell's price is $3.07 a barrel for crude of 36-36.9° gravity, with a 2-cent differential for each degree upward to 40°. Shell's price for crude of 40° and above is $3.15.

Casing the World's Deepest Well

PHILLIPS PETROLEUM CO. has rewritten the record book on casing and cementing.

The company's 1-EE University in Pecos County, Texas, already the world's deepest well, at 23,011 ft. now claims:

... The longest casing string ever run. The 22,919 ft. of 7-in. and 7⅝-in. is more than 3,100 ft. longer than the old record of 19,765 set by a Wyoming well in 1949.

... The deepest pipe ever set. Casing shoe in the 1-EE University is more than 1,100 ft. deeper than that in Richardson & Bass' recent Louisiana deep well. R&B set a 5-in. liner to 21,809 ft.

... The longest column of cement ever placed. The slurry reached from the casing shoe at 22,919 ft. up to 4,100 ft. in a single stage—a total column of 18,819 ft. of cement.

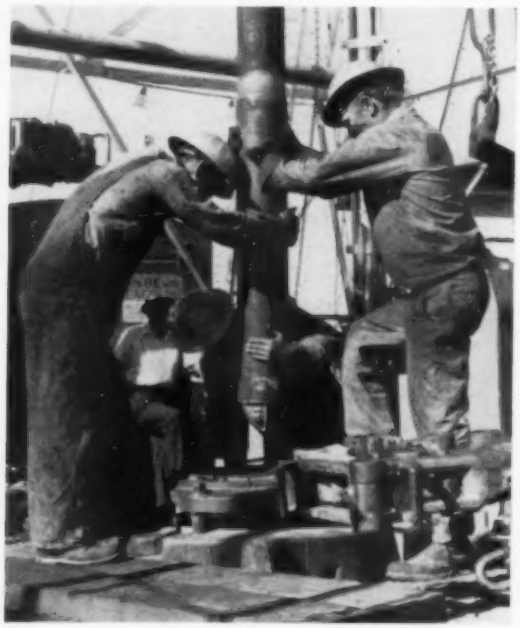
Perhaps the most remarkable fact about the new record casing job is the smooth, trouble-free way it was done. More than 60 hours elapsed from the time the last bit was pulled off bottom until the top cement plug bumped bottom. During that time there was no unusual difficulty of any kind.

The smoothness of the job can't be called entirely luck nor accident. Phillips and the service and supply companies on the job took every known precaution to make sure there'd be no slipups.

Open-hole worry gone ... Purpose of the deep casing string was to seal off nearly 12,000 ft. of open hole below a 9⅝-in. string set to 10,996 ft. (OGJ, June 2, p. 63, and June 16, p. 61). Phillips, using its company rig No. 27, plans drilling to perhaps 25,000 ft. to reach the Ellenburger formation, and chances are much better to get there

Box Score on Record Casing Job

Total Length of String	22,919 ft.
Number of Joints	
7⅝-in. o.d.	256 (10,312 ft.)
7-in. o.d.	316 (12,603 ft.)
Total Weight of Pipe in Air	700,000 lb.
Maximum Weight-Indicator Reading	580,000 lb.
Total Pipe-Running Time	28 hr.
Circulating Time Before Cementing	3 hr.
Cement Mixing Time	1 hr., 27 min.
Cement Displacing Time	1 hr., 40 min.
Maximum Mixing and Pumping Pressure	1,250 psi.
Pressure When Plug Bumped	1,750 psi.
Bottom-Hole Temperature, Static	316° to 320° F.
Slurry Weights	
1,147 Sacks Trinity Inferno with 40% Diacel D and 1½% Diacel LWL	10.8 lb. per gal.
100 Sacks Trinity Inferno with ½% Diacel LWL	16 lb. per gal.
Slurry Mixing Rate	6 bbl. per min.
Cement Top from Temperature Log	4,100 ft.



Who Planned the Job and How It Was Done

HERE'S how the casing job for the world's deepest well was executed.

The men who planned it gather in the doghouse. Left to right: Don Miller, Phillips area manager; Ed Trapp, Halliburton sales manager; H. W. Patterson, Phillips drilling superintendent; Ted McKnight, Phillips district drilling superintendent; and C. L. Fulton, Halliburton assistant division manager.

At right, the bottom joint of 7-in. casing enters the hole. Opposite page, cementing equipment is assembled and put in use during the job. Lo-boy cementing units and field storage bins are at left, water tanks at top, and mud tanks at right.

with the 22,919 ft. of casing in place.

Check and double-check . . . Phillips took out a lot of "insurance" on the success of the job. Here are the "premiums" it had to pay:

. . . Derrick was relegged.

. . . A new 1⅜-in. wire line was strung with 12 lines to the blocks.

. . . The elevator bails, ears, bowls, hook on the traveling block, slip inserts, and pickup subs were magnafluxed.

. . . Two complete sets of all pipe-handling equipment, such as slips, elevators, tongs, etc., were brought in —one set to serve as standby.

. . . Upsets on all P-110 pipe, which made up majority of string, were sandblasted and magnafluxed.

. . . All crossover subs and lift plugs and floating equipment were magnafluxed.

. . . Connections on bottom five joints were preheated before welding, and welds were air-cooled before lowering into the hole.

. . . Welds on bottom five connections were magnafluxed.

. . . Pipe was run slowly enough to keep down ram effect.

. . . Cementing pressures were kept low to prevent excess loss of circulation.

. . . Slurry weight was kept to 10.8 lb. per gallon with Diacel D.

One factor given credit for the trouble-free job was the mud program and good condition of the hole. Phillips used a 10.2 lb. per gallon low-solids, water-base, Driscose emulsion mud with viscosity in a 48-52 seconds range and fluid loss of 5 cc. per 30 minutes. The emulsion was about 8% diesel oil with graphite added for torque and drag reduction.

Advance planning . . . Before the start of the job Phillips technical and operating groups had collaborated on every detail. Metallurgists, drilling engineers and others calculated expected stresses and danger points.

The casing operation got under way at 8:45 a.m., June 10, when the first joint of the combination string (12,612.15 ft. of 7-in. and 10,306.85 ft. of 7⅝-in.) started in the hole. In addition to preheating and welding the bottom five joints, the crew also welded a fill shoe, fill collar, and two float collars.

Phillips didn't consider it practical to attempt rotation or reciprocation of such an extremely long string of casing after it got to bottom. For that reason, no centralizers or scratchers were used.

By 11 a.m. the following day the pipe was 50 ft. off bottom. The last two joints were circulated to bottom by 2:15 p.m.

Although there was a 20,000 to 30,000-lb. drag on the drill pipe in a 9° off-vertical section of the hole below 21,000 ft., walls of the hole did not slough.

When the pipe got to total depth and circulation was started, returns were only about two-thirds of the pumping rate. This partial loss of returns continued as cement was placed, and complete returns were regained only when the job was finished.

Cementing equipment . . . Halliburton Oil Well Cementing Co. equipment included four lo-boy cementing units,

each mounting two T-10 pumps; four 1,200 cu. ft. field storage bins; two 500-bbl. mud tanks and one 250-bbl. mud tank; one bulk cement truck; and a standby cementing truck that was not used.

Phillips' relatively new cementing development, Diacel Cement Systems, was used. The cementing material consisted of 1,147 sacks of Trinity Slo-Set cement; 42,127 lb. (40% by weight of the cement) of Diacel D, a low density additive; 1,617 lb. (1.5% by weight of the cement) of Diacel LWL, a low water loss and retarder additive; and 100 sacks of Trinity Inferno Slo-Set cement with 141 lb. of Diacel LWL, ½ of 1%, to tail-in the lower portion of the casing and the shoe.

An excess of 10% cement was run over the calculated amount. Static bottom-hole temperature was 315° F.

Cementing operation . . . With the four cementing units alternating as two teams, the mixing of cement started at 2:43 p.m.

It was planned not to exceed 2,000 psi. during the cementing operation. The minimum pumping rate was set at 6 bbl. per minute. As the cementing started, pump pressure was 1,800 psi. but quickly settled to 1,500 psi.

At 4:37 p.m., 1 hour and 54 minutes from the start of the job, all the cement was mixed and in the casing. A 7⅝-in. five-wiper top-cementing plug was released from the single plug container head to follow the cement. No bottom plug or measuring line was used.

The cement was displaced with mud pumped by Halliburton cementing units until the plug was bumped at 6:20 p.m. Total displacement time was 1 hour and 43 minutes.

Displacement rate varied from 6 bbl. per minute to 14 bbl. per minute with an average rate of 9.2 bbl. Total displacement was 951 bbl. Displacement pressures ranged from 900 psi. to 1,900 psi. but remained at about 1,600 psi. during most of the job.

Mixing, pumping, and displacing required 3 hours and 37 minutes, easily within the 5 hours and 4 minutes pumping life calculated beforehand for the cement. A total of 5,183 cu. ft. of cement slurry was displaced during the job. The cement was mixed at 10.8 lb. per gallon. It was tailed in with a 16.0-lb.-per-gal. slurry.

Who planned it . . . Cement formulation was planned by Dr. Frank Shell, Bartlesville, Okla., assistant director of Drilling Specialties Co.'s technical service division, and William C. Carlile, Odessa, Tex., Halliburton division chemist.

The first work was done in Bartlesville. The specific cement formulation was finalized by Shell and Carlile in Halliburton's Odessa field laboratory.

A temperature survey following the job indicated the top of the cement was 4,100 ft. from the surface—the world's longest cement column ever placed. Due to careful preplanning of cement formulation, cementing techniques, and job performance, the cement was run in a single stage.

The 1-EE University drilled beyond 22,570 ft. on May 25 and took the world depth record away from the former title-holder, a Richardson & Bass et al well in South Louisiana (OGJ, June 2, p. 63).

Importers Multiplying

. . . and the growing number of quota requests will put the Cabinet fuels committee on the spot again in September.

THE CABINET fuels committee will have a tough nut to crack this fall as a result of mounting pressure on the voluntary crude import program for Districts 1-4.

A steady flow of requests for quotas is coming to Capt. M. V. Carson, Jr., program director, from companies seeking to get into the import field. At the same time the pressure of domestic producers for further cuts in imports continues.

The current import program was mapped out only to the end of the coming quarter. The cabinet committee, therefore, is expected to review the situation in September. Additional demands for quotas and signs that crude demand will increase during the next 3 months indicate the likelihood of a revision.

Carson already has on file 39 requests for quotas totaling 267,884 bbl. daily. Many others are expected to come in over the next 2 months as a result of signs that demand is finally on the upgrade.

These requests are expected to be heard by Carson toward the end of the coming quarter. The committee's March 24 report, cutting the over-all import from 782,900 to 713,000 bbl. daily, ordered that no applications could be considered before September 1.

Eight of the petitions so far received are from companies that do not refine. Thus, they do not meet the committee's stipulation that importers must have existing refinery capacity in this country. Three or four others are from companies seeking to bring in crude to make asphalt.

The cabinet committee, in its reports, has stressed its intention of keeping crude imports down to 12% of production in Districts 1-4. At the same time, it has held that some room must be made in the import field for legitimate newcomers.

The problem coming up this fall will be one of fitting eligible newcomers into a very tight import set-up.

Previous cutbacks . . . Carson and the committee faced the same problem last March. They solved it by cutting the quotas of existing importers a little each month from June through September as newcomers were gradually added to the list.

In this way, the seven major importers, whose quotas were chopped from 493,100 bbl. daily in March to 447,800 bbl. in April, were further reduced this month to 444,500 bbl. Another 14,300 bbl. will be lopped off their daily allowables in three steps during the coming quarter. By September they will be down to 420,200 bbl. a day.

All of the smaller companies then holding quotas were cut back also, by small amounts, with the exception of two whose quotas were only 300 bbl. daily.

The 43,500 bbl. daily thus secured was parceled out among 12 newcomers, to be put on the list a few each month. The first two were allowed to begin importing this month. The last two will start in September.

Whether the same formula can again be applied this fall is the question.

The Independent Petroleum Association of America forecasts an increase of 700,000 bbl. daily in crude production in the third quarter. But even if this develops and the over-all import quota is raised in step with it, the possible rise in imports which might be made to keep the 12% ratio would take care of only a small part of the new quotas that are being asked.

On the other hand, there is the question of how far existing importers can be moved over to make room for newcomers without, in some instances, reducing the value of their own quotas to the vanishing point.

Major Refinery

planned in eastern Canada by Irving and Socal. Plant will be completed in 1960.

EASTERN Canada's newest refinery will be a major installation capable of making high-quality fuels.

Irving Refining, Ltd., at St. John, N. B. will process up to 40,000 bbl. per day of imported crude, probably from the Middle East.

The two-stage crude unit will be equipped with a desalter. A fluid catalytic cracking unit will handle 9,500 bbl. daily of fresh feed plus 3,800 bbl. of recycle. A central gas-recovery unit and LPG treating facilities are included in refinery design.

The 7,150-bbl. catalytic reformer will treat mixed naphthas. But Middle East crudes are low in naphthenes, so the hydrogen make will be too low to fill the refinery's desulfurizing requirements. A Saudi Arabian mixture, for example, shows only 18.5% naphthenes contrasted with 62.7% paraffins and 16.1% aromatics in the heavy naphtha fraction.

Hydrogen plan . . . Irving will be the second modern refinery to add hydrogen manufacturing. The first: Tidewater Oil Co.'s new Delaware refinery.

PROCESSING BRIEFS...

The merger of Suntide Refining Co. into Sunray Mid-Continent Oil Co. has been shelved, at least temporarily, because of opposition of certain stockholders who object to the proposed merger agreement. The two companies earlier had entered into a memorandum under which Suntide and its 65,000-bbl. refinery at Corpus Christi would have been taken over fully by Sunray, which now owns approximately 50% of the Suntide stock (OGJ, Apr. 28, p. 69). A new effort to put the merger into effect is expected.

A 2,400-bbl. alkylation unit has been placed on stream at Shell Oil Co.'s Anacortes, Wash. refinery. In conection with the new unit, Shell has installed 200,000 bbl. of tankage and 30,000 bbl. of spherical pressure storage vessels. Sulfuric acid for the new unit is coming from the adjoining plant of General Chemical Division of Allied Chemical & Dye Corp., where a new acid plant is on stream. Shell is providing hydrogen sulfide for the acid plant. Fluor Corp. built the alkylation unit for Shell.

Socony Mobil Oil Co. has laid off 74 of the approximately 2,600 employes of its Paulsboro, N. J. refinery. Officials said the move was the result of improvement of facilities to increase operating efficiency, changes in production requirements, and failure of petroleum demand to reach expected levels.

Sinclair Refining Co. has stopped purchasing and gathering Pennsylvania Grade crude oil for its 8,000-bbl. Wellsville, N. Y., refinery, which will be dismantled. Sinclair offered the

The unit will have a capacity for turning out 3,000 M.c.f. per day. This additional hydrogen will be needed for the 5,000-bbl. hydrodesulfurization unit treating heavy stove oil, No. 2 burning oil, and diesel fuel, and for the 2,500-bbl. unit which will treat intermediate light catalytic cycle oil. The reformer, packaged with its own hydrogen treating unit, will be essentially self-sufficient on hydrogen.

The new project is jointly owned by Irving Oil Co., Ltd., and Standard Oil Co. of California. The latter will furnish crude, and refined products will be marketed through Irving's outlets in New Brunswick and other eastern provinces of Canada. Canadian Bechtel, Ltd., will design and construct the process units. Completion is slated for 1960.

Increased Gas Tax Signed

GOV. EARL K. LONG last week signed into law a measure which will double Louisiana's gas gathering tax, but the Louisiana House of Representatives voted down a proposed constitutional amendment which would triple the present tax.

The new law, increasing the gathering tax from the present 1 cent to 2 cents per M.c.f., becomes effective August 1. It will cost Louisiana producers an estimated $19,000,000 to $20,000,000 annually.

Unless extended, the tax increase will expire in 2 years.

The amendment defeated in the house would have set the tariff at 3 cents and would have made the increase permanent.

Import Quota Chances Fading

THE House-passed foreign-trade bill is before the Senate finance committee this week for a final going-over before it is sent to the Senate floor.

The finance committee made a weekend start on its hearings in the hope of getting the bill to the floor before the end of the month. But opponents of the reciprocal trade program are expected to make as long a fight as possible for amendment of the measure before it is offered for final vote.

Domestic oil producers may be given a last chance to urge import quotas, although Committee Chairman Harry F. Byrd (D-Va.) wants to hold witnesses to discussion of the bill as it passed the House.

There are no signs that the committee will be receptive to the idea of quotas. But there is a possibility that the national-security clause (Section 7) may be further strengthened.

Senators are aware that any bill carrying import quotas would almost surely be vetoed by the President. That is something few members of Congress want.

But the protectionist forces are stronger in the Senate than in the House. And something probably will have to be done to placate them. A national-security clause with teeth, perhaps requiring the President to make import controls mandatory, might do the trick.

Difference in houses . . . Three things will help the cause of the domestic producers.

The Senate has no gag rule on debate, as does the House. There is no limit on amendments. And there is a difference in make-up of the members.

The last is quite important. Industrial states, where free-trade sentiment prevails, have large delegations in the House. Their votes far outweigh those of many of the oil producing states. But in the Senate each state has only two votes. That helps even things out.

Thus, refusal of the committee to adopt any changes will not be a deterrent to one last fight on the floor when the bill comes up for debate.

Leading senators, however, are confident the bill can be passed without any "crippling amendments," such as quotas, against which the administration has warned.

Majority Leader Lyndon Johnson (D-Tex.) has promised to support the measure. Minority Leader William F. Knowland (R-Calif.) looks for a bill acceptable to the President although possibly calling for a 3-year instead of a 5-year extension. Sen. Robert S. Kerr (D-Okla.), leading Democratic member of the committee, sees little chance for any broad changes. Sen. Edward Martin (R-Pa.) ranking Republican member, also will give his support.

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pipeline facilities involved to the producers. Sinclair said it had tried to find refiners to buy the crude in Allegany and Steuben counties, New York, and had received assurances that other buyers might take part of the crude for a limited time.

Fluor Corp. has been awarded the engineering and construction contract on the 55,000-bbl. daily Esso Model IV fluid catalytic cracker Standard Oil Co. of California is going to build at its Richmond, Calif., refinery.

Pan American Petroleum Corp. will build a natural-gasoline plant on a 20-acre site 18 miles north of Monahans, Tex. The plant will process casinghead gas from five formations of the North Monahans field. Initial capacity will be 4 million cubic feet of gas a day with one compressor, but the design allows an ultimate capacity of 12 million cubic feet a day with additional equipment. Construction will start next month, and completion is scheduled for November.

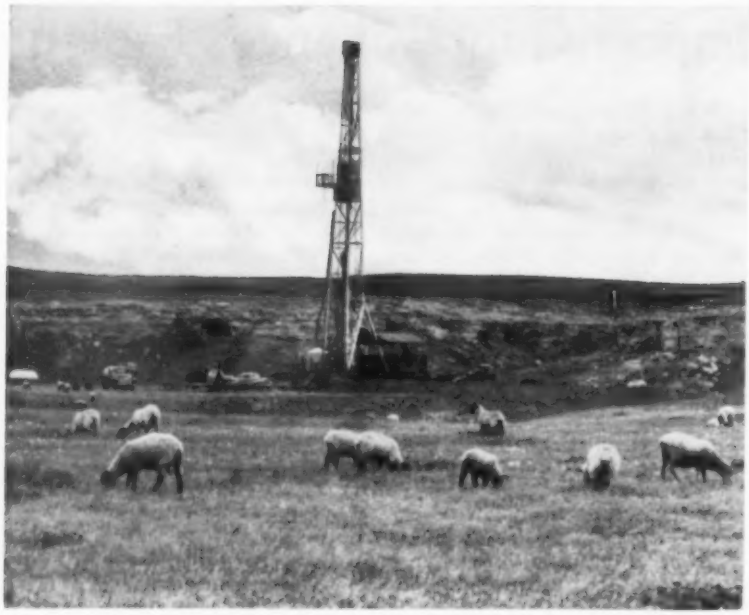
El Paso Natural Gas Co. has begun construction of a natural-gasoline plant at Opal in southwestern Wyoming. The plant will be able to handle 250,000 M.c.f. daily upon completion late this year. Daily recovery will include 62,000 gal. of natural gasoline, 83,000 gal. of butane, and 122,000 gal. of propane. The gasoline will be used for blending at refineries in Salt Lake City.

West Branch Refineries, Inc., West Branch, Mich., has started up its new 1,150-bbl. per day Houdriformer designed to produce high octane fuels from Canadian and Michigan naphthas. Naphtha feed is pretreated for sulfur removal in guard case catalytic reactor. Reforming section is conventionally designed.

Also for Refiners . . .

IN THE NEWS: D-X Sunray can turn out 105-octane fuels at its expanded Tulsa refinery (p. 74) . . . Oil companies say "no" to OCAW demands (p. 76) . . . Canada's newest refinery at St. John, N. B., will be a full-fledged operation (p. 80) . . . Venezuela's military junta has exposed a scandal in connection with the government's petrochemical plant at Moron (p. 86) . . . First shipment of North Sumatran crude since before World War II goes to Japanese firm (p. 89).

PLUS THESE TECHNICAL REPORTS: A special section on Sohio's new Toledo refinery (starts on page 95) . . . How La Gloria's blowdown systems work (p. 125) . . . Magnolia's Beaumont refinery expands (p. 126).



UNITIZATION spreads to such Denver basin fields as Sloss where . . .

Big Nebraska Flood Planned

OPERATORS at Sloss field, the largest in Nebraska and second largest in the Denver basin, plan to launch a major water flood next month.

Unitization of the 4,880-acre field in Kimball County, already signed by 98.2% of the working interest, will be effective July 1. Water injection will begin shortly thereafter.

Pan American Petroleum Corp., which holds most of the working interest, will operate the flood of the Muddy "J" sand, found at about 6,300 ft.

Company engineers estimate the water injection will increase recovery of oil in place from about 25% through primary means, to 40% through secondary recovery. The field, discovered 4 years ago, has already produced more than 3,900,000 bbl.

Production drops . . . Production has declined considerably since peak output of last year.

The big field was discovered by James P. Sloss and Nebraska Drillers, Inc., at the 2 State. Since then 88 producers have been drilled, and edge drilling is still going on. Wells were averaging about 66 bbl. of oil daily last March.

Peak production came in June 1957 when 71 wells were making 9,550 bbl. daily. But by March 1958, production had declined to 5,550 bbl. daily from 84 wells.

Original reservoir pressure was 1,415 psia. but had declined to 683 psia. by May 1957. The reservoir is now producing essentially below the bubble point of 689 psia.

Type of flood . . . Plans call for a modified staggered line-drive flood, starting simultaneously at two or three rows of wells.

This type of flood pattern initially will require between 10 and 15 injection wells. The rows of injection wells will align themselves in a northwest-southeast direction.

Daily water injection is expected to be in the range of 10,000 to 12,000 bbl. The injection plant now being installed is designed to handle 12,000 bbl. of water daily.

The program may be modified depending on initial results and water availability. Water will be obtained from water wells within the unit area.

Unitization increasing . . . The Sloss unit is the largest of a number of proposed units being considered for the Denver basin.

Besides Pan Am, principal working interests at Sloss include Magnolia Petroleum Co., British-American Oil Producing Co., Skelly Oil Co., Nebraska Drillers, and Tekoil Corp.

Pan Am is involved in plans for 11 other proposed units, including Vedene, Harrisburg, Edwards, Gehrke, Long, Kimball, Ostgren, Vowers, and Petroleum State fields in Nebraska, and Plum Bush Creek and Elm Grove fields in Colorado.

Texas Strike Ends

as Phillips' workers return to jobs under new contract.

STRIKING EMPLOYES at the Phillips Petroleum Co. plants in the Borger, Tex., area have returned to work under new contracts which provide for neither wage increases nor reinstatement of 33 men who were fired during the strike.

Members of Local 351, International Union of Operating Engineers (AFL-CIO) voted 1,177 to 422 to end the strike, which began May 1 at the butadiene plant and spread on May 14 to other plants in the area.

Under the agreement, the 33 men who were discharged for shutting down the gasoline plant on May 14 contrary to orders of supervisors will not be rehired. The union, however, is expected to take the case to the National Labor Relations Board. The firings were a major issue during negotiations.

Phillips has charged the union with $831,000 worth of damage during the strike.

K. S. Adams, Phillips board chairman, said contracts have been signed with all units except two which have petitioned the NLRB for decertification. If the NLRB approves the petition, the union no longer will represent the two units involved.

The new contract is for 3 years but can be reopened for wage negotiations annually. There were no wage increases or adjustments of job classification rates.

"Normal operations will soon be under way at all Phillips facilities in the area with employes being called back to their jobs as needed," Adams said.

All the Phillips plants continued in operation during the strike although at reduced output. Supervisory personnel, technicians, and non-union members operated the plants for the most part, although more than 200 of the 2,700 strikers returned to work before the strike was called off.

Field Straddles State Line

OIL RESERVES CORP. of Houston last week extended South Louisiana's new Alligator Lake field a mile westward across the state line (Sabine River) into Newton County, Texas, where it becomes another two-state oil-producing area.

The extension well, 1-K Kirby, is the second for the field, discovered last February by Russell Maguire with production from a 10,600-ft. Wilcox sand. It flowed 215 bbl. of 42.2°-

gravity oil per day through 11/64-in. choke with pay interval at 10,655-62 ft.

Location is on a small island in the state-line river. The field's discovery, and, until now, only other well, is about ½ mile from the east bank of the river in the northwest corner of Beauregard Parish.

No Exports Credit

will be allowed importers to get them under their quotas.

THE INTERIOR DEPARTMENT last week refused to let a crude importer credit his crude or product exports against his quota.

A decision by Under Sec. Hatfield Chilson ended an effort of Eastern States Petroleum & Chemical Corp. to be held eligible for government contracts under the executive order of March 27.

Chilson's decision restated a finding by Capt. M. V. Carson, Jr., import program administrator, that Eastern States had not been in compliance with the program in the 3 months prior to its submission of bids for oil contracts from the Military Petroleum Supply Agency.

In order that it might be eligible for government contracts, the company asked Carson to increase its quota or allow credit for exports. Both pleas were rejected by the administrator and an appeal was carried to Sec. Fred A. Seaton, who assigned Chilson to handle it.

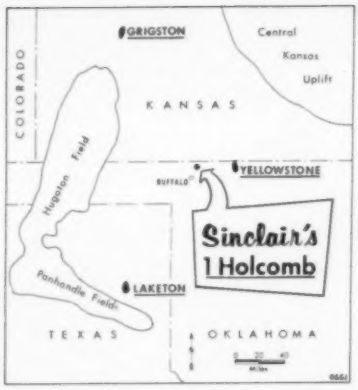
Eastern States' original quota was 18,300 bbl. daily. Last year it asked for an increase to 22,800 bbl. daily for the last half of 1957 and 27,000 bbl. a day thereafter. No increase was granted.

Imports rising . . . The company this month asked again that its quota be raised to 27,000 bbl. daily, retroactive to January 1, which it said would bring it into compliance with the program and the executive order.

An interior official said that the company has not filed monthly reports with Carson since January. But earlier reports and figures of the Texas Railroad Commission show that from July 1957 through March 1958 it imported an average of 24,600 bbl. daily, against its 18,300-bbl. quota.

The latest figures available cover April and indicated imports of 32,400 bbl. daily against an allocation of 16,600 bbl.

The plea to be allowed to credit exports against imports was based on a contract for the importation of crude to be paid for with exports.



More Arbuckle Oil

discovered in northwestern Anadarko basin by Sinclair.

THE VAST northwestern Anadarko basin has picked up its fourth Arbuckle oil-producing area.

The new discovery is Sinclair Oil & Gas Co.'s Holcomb, north of the town of Buffalo in Harper County.

The 1 Holcomb is about 35 miles west of the only other Arbuckle producer—Yellowstone field in Woods County—in the Oklahoma portion of the northwestern Anadarko basin.

Prior to the 1 Holcomb, the last discovery in the Arbuckle rocks of the huge area occurred 4 years ago in Scott County, Kansas, far to the northwest. The Kansas well, W. L. Harman's 1 Rush, opened Grigston field and was the first Arbuckle oil production in the Anadarko basin of western Kansas. Prior to that the only Arbuckle production in western Kansas was in the central Kansas uplift fields far to the east.

A year after the Scott County strike, the first Ellenburger production was opened in the Texas portion of the basin at Laketon in Gray County. The Ellenburger is the close equivalent of the Arbuckle in the Texas Panhandle.

The Texas well, Phillips 1 Troy A, also became the Panhandle's deepest producer at 11,290 ft.

The newest discovery in Oklahoma's Harper County flowed 400 bbl. of 48°-gravity oil in 14 hours on 13/64-in. choke from perforations between 7,664 and 7,717 ft. in the Arbuckle (Cambro-Ordovician).

The well has been in the discovery news for several weeks. It first found gas production in the Kansas City-Pennsylvanian lime at the rate of 9,780 M.c.f. per day. Gas also was tested in the Oswego, Mississippi lime, and Viola.

Industry briefs

Henry Vander Pas, pioneer Montana oil man, has sold his interests in the Kevin-Sunburst field to Main Realty, Inc., of Ferdig, Mont. The Vander Pas properties included five leases with 56 oil wells and 1 gas well. The sale price was not disclosed. Main Realty is composed of Hesla Oil Co., Olaf Hesla, Merton Hesla, Warren Herd, and Ed Vander Pas, all of Ferdig.

Tekoil Corp., Dallas, has acquired Petroleum Technologists, Inc., California-based engineering and laboratory service firm. The newly purchased firm will be merged with Reservoir Engineering Laboratories, a Dallas-based company which Tekoil acquired last September. The merged company will operate under the name Petroleum Technologists, Inc. It will be headed by Dr. Norris Johnston, who headed the California company before Tekoil bought it.

The firm will continue operations along the West Coast, in the Four Corners area, and Latin America. But headquarters will be in Dallas. Reservoir Engineering operated in the Southwest and Canada. Operations in Colombia, conducted from Bogota under the name of Coltech, Limitada, will be directed by James D. Richards. Robert E. Lampkin will direct West Coast activities.

Shareholders of Sparmac Petroleums, Ltd., and Walmore Petroleums, Ltd., have voted to approve sale of their companies to Tidal Petroleum Corp., Ltd., Edmonton. Tidal will exchange 664,598 shares of common stock for Sparmac and 115,000 shares for assets of Walmore.

Pennsylvania State University has begun construction of a new petroleum laboratory, scheduled for completion in the fall of 1959. It will provide increased facilities for research and graduate instruction in chemistry and chemical engineering. The new building will include total floor area of about 30,000 sq. ft. and a pilot-plant wing of approximately 1,000 sq. ft., with headroom of more than 50 ft. The lab, founded in 1929, has a full-time staff of 40.

Northern Ontario Natural Gas Co., Ltd., has contracted to provide 6 million cubic feet daily of natural gas over a 20-year period to International Nickel Co. of Canada, Ltd. The nickel producing firm is converting a portion of its fuel requirements to natural gas.

Line From Rockies Expanding

SERVICE PIPE LINE CO. is expanding its system from Wyoming to Freeman, Mo., by 39,000 bbl. per day to handle increased demand for Rocky Mountain crude, particularly Wyoming black.

The line supplies refineries in the Kansas City, St. Louis, and Chicago areas, and connecting pipelines serving the East.

The expansion includes construction of 123 miles of new pipeline, takeup and reconditioning 54 miles, and installation of 12,200 hp. at new and existing pump stations.

Pipeline construction . . . Service has awarded a contract to O. R. Burden Construction Corp., Tulsa, to lay 47 miles of 12-in. in Johnson and Natrona counties, Wyoming.

This includes a 17-mile section north from the Casper station near Midwest, toward the Salt Creek station, and 30 miles to connect Salt Creek with North Fork field, which has no pipeline outlet and is operated by Pan American Petroleum Corp., a Service affiliate.

Service last week was authorized by the Wyoming Public Service Commission to build the North Fork line. A similar proposal by Kaycee Pipeline Co. was denied. Big Horn Pipeline Co. previously withdrew its application for a line to North Fork, a unitized field with 4,600-bbl. daily production and recoverable reserves estimated at 10 million barrels.

Big Horn, which originally sought to build a line from Ash Creek to Midwest, may now seek to build the Ash Creek-North Fork section and connect with the Service extension.

Burden also received a contract to takeup and recondition 54 miles of 12-in. between Service's Fort Laramie station and Glendo Junction, and between Welch station and South Cole Creek Junction. The pipe will be reconditioned in a yard at Glenrock, Wyo., and used on the North Fork line.

Burden started May 1 laying a 76-mile, 20-in. line in two sections between Casper and Fort Laramie to replace the 12-in. which will be taken up. The 20-in. project will be completed next month.

Pump-station expansion . . . New stations will be constructed near Herndon and Scranton in Kansas and LaGrange, Wyo.

At Herndon two 2,000-hp. dual-fuel diesel engines will be installed. An unattended, outdoor 2,000-hp. electric-motor unit will be built at Scranton. A third dual-fuel engine unit of 2,000 hp. will be added to the two existing at Laton station in Kansas. An increase in power is also planned at the Sterling, Colo., station.

A 2,000-hp. unattended electric station is planned at LaGrange on the Fort Laramie-Sterling section. A diesel station at Welch will be retired and the machinery at the unattended electric stations at Big Muddy, Wendover, and Horseshoe, Wyo., will be relocated to increase the capacity of the Fort Laramie station.

A total of 2,200 hp. will be added at Elk Basin, Kirby, Owl Creek, and Lost Cabin pump stations in Wyoming. All of the new units will drive centrifugal pumps.

Large Texas Gas Well Hit

TIMBERLAND Exploration Co. of Houston last week brought in one of the largest gas wells ever completed in southeastern Texas.

The well, second for the recently discovered gas area northwest of Mauriceville in northern Orange County, is estimated good for 280,000,000 cu. ft. of gas per day.

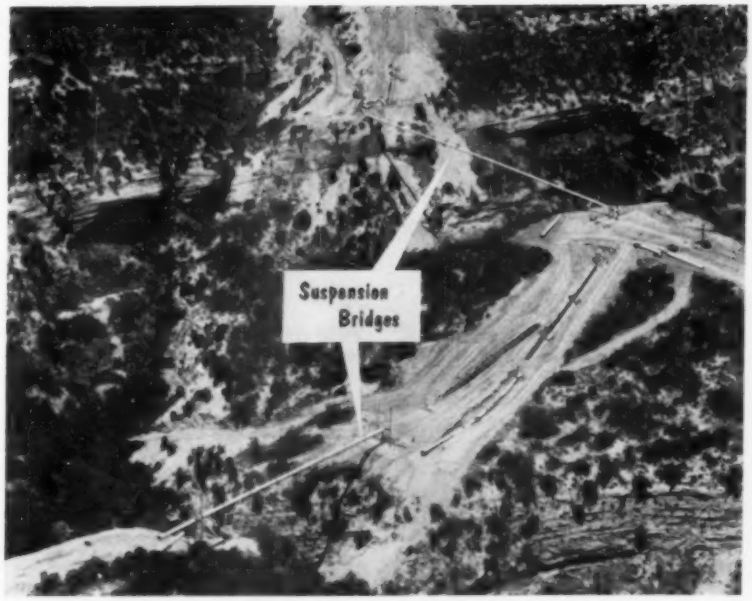
It is Timberland's 1-C Brown, drilled to 8,043 ft. and productive from Nodosaria sand at 7,940-47 ft. Gas yielded 58°-gravity condensate in the ratio of 83,300 cu. ft. of gas per barrel of liquid. Shut-in pressure is 2,507 psi.

Location is the east offset to Timberland's discovery well (3 Mrs. B. M. Odom), completed with a potential flow of 52,000,000 cu. ft. of gas per day from the same sand at 7,953-58 ft. The new area is 2¾ miles southeast of the Adams Ranch gas-condensate field.

PIPELINE

Plantation Pipe Line Co. plans to lay a 48-mile, 4-in. line paralleling its line from Bremen and LaGrange, Ga., this summer. The line will increase the capacity for pumping products available to Columbus and Macon. This $900,000 project is in addition to a $2,440,000 expansion begun in the spring to install larger pumps, motors, and auxiliary equipment at 12 pump stations on the Baton Rouge, La.-Greensboro, N. C., system. Capacity when the installations have been completed will be 334,000 bbl. per day.

Sinclair Pipe Line Co. will complete the second phase of a modernization program next week on its system from North Texas to the Gulf Coast. A 149-mile, 20-in. line from



AERIAL VIEW shows two of the pipeline's five suspension bridges.

Pipeline Job Short But Rugged

PACIFIC LIGHTING Gas Supply Co. is putting the finishing touches on a 34-in. natural-gas pipeline in California which encountered a variety of pipelining problems in a short length of line.

From its northern terminus at North Coles Levee in Kern County to its southern terminus at Newhall on the edge of the Los Angeles Basin, the pipeline:

... Makes three suspension-bridge canyon crossings within a distance of less than 1 mile.

... Makes two suspension - bridge river crossings—one of them 1,325 ft. long.

... Starts out at an altitude of about 1,000 ft., climbs to nearly 5,000 ft. and then drops down to around 1,000 ft. again at the southern end.

... Crosses uninhabited wasteland, cultivated farm land, rugged mountains, and suburban residential areas.

It does all these things in the short pipeline span of 82½ miles.

Slated for completion the middle of July, the $14,000,000 line will have a working capacity of 546,000,000 cu. ft. daily. San Joaquin Valley gas will leave North Coles Levee at 750 psi. and arrive downstream at Newhall at 465 psi. No pressure-limiting stations will be used.

Rugged terrain ... Preliminary studies of the proposed route quickly indicated a little more than the ordinary amount of engineering and construction planning would be necessary on the line.

For one thing, it was estimated that because of the rough terrain through Angelus National Forest, it would require a conventional survey crew more than 42 weeks to complete their phase of the job. In addition, engineers were concerned that coordinating the work of two or more crews would be extremely difficult and would increase the odds on mistakes in accuracy because of the tough country involved.

Photogrammetry was finally selected for surveying the route.

The results were excellent, according to Pacific Lighting.

Using a scale of 1-in. to 1,500 ft. on the ground, with a 60% overlap, the route was photographed at the rate of 4,500 ft. of ground per picture taken from an altitude of 9,000 ft. A stereoplanigraph was then used to work up complete legal descriptions from one end of the line to the other.

After portions of the line were completed, a ground survey crew was put to work locating sites for intermediate facilities on the line.

Pacific Lighting said the photogrammetry survey was completed in just 40% of the time a ground survey would have needed. And it cost 45% less than a conventional ground survey.

BRIEFS . . .

Teague to near Houston is to be completed around July 1. Lone Star Constructors, Inc., Dallas, laid 143 miles and Golightly Construction Corp., 6 miles on the Houston end. This line and a 152-mile, 18-in. section completed from Jacksboro to Teague in April 1956 will replace old multiple 8-in. lines.

Sinclair will install 4,000 hp. at its Colonels station near Teague and 2,450-hp. in pumping capacity at its Hensley station near Jacksboro. The pump-station work is to be completed by the first of the year.

Wabash Pipe Line Co., a new products system recently organized by Ohio Oil Co. and Continental Oil Co., will receive bids June 30 on a 265-mile, 12-in. line from Wood River, Ill., to East Chicago, Ind. The job will be let in two sections. Construction is to start next month. One section of the line, 85 miles of 12-in. from Ohio's Robinson, Ill., refinery to Champaign, Ill., where it will connect with the Wood River-East Chicago line, was completed by Ohio last year. Ohio will operate Wabash as owner of 75% of the company's stock.

Shell Pipe Line Corp. is getting ready to start construction of its Delta Pipe Line from the Southwest Pass area on the Louisiana coast to Shell Oil Co.'s Norco refinery near New Orleans. Bids will be received next week on the 118.5-mile line which will have various diameters up to 20 in.

Also for Pipeliners . . .

IN THE NEWS: Humble awards contracts for part of King Ranch gas-gathering system (p. 75) . . . Service starts expansion of its crude system from Wyoming to Missouri (p. 84) . . . Many problems crop up in building 34-in. gas line in California's rugged mountains (p. 85) . . . Russia's longest pipeline, a 2,315-mile crude system, is being laid (p. 90).

PLUS THESE TECHNICAL REPORTS: A $100-million terminal will improve transportation system for Maracaibo crude (p. 131) . . . Pipeline construction report (p. 143).

More Control Is Sought

. . . in proposed Indonesian oil law. New bill would give government 51% interest in jointly held concessions.

INDONESIA hopes to follow the lead of Iran and move into the oil industry itself.

This was apparent last week in the terms of the long-awaited "new" oil law that is being proposed for the revolt-ridden archipelago of Asian islands. The new oil-mining bill was published last week in Djakarta. It still has to go through the laborious parliamentary process before it becomes law.

The new bill divides new oil concessions into three types that have become familiar since Iran revised its basic oil legislation. They are:

. . . **Government-operated** oil operations.

. . . **Joint government-private** enterprises.

. . . **Private oil concessions** like those that exist today in the country.

Indonesia is looking for a more active role in its industry. The new bill provides that the joint companies must be organized in Indonesia with at least 51% control held by the Indonesian Government.

The proposed bill would set a 30-year limit on an exploitation concession with two possible 10-year extensions. A 100,000-hectare (about 247,000 acres) limit is placed on concessions for a private or joint private and government operation.

It calls for a "down payment" of 2½ rupiahs per hectare (about 22 cents at the official rate of exchange) for a concession, plus a sliding scale of annual rentals that reaches 10 rupiahs per hectare (about 88 cents) after the third year.

Early press reports from Djakarta last week did not mention any provisions for bonuses or a division of the profits from commercial production. Companies now operating in Indonesia would not comment on the new terms until they study the new bill.

Background . . . No new concessions have been granted by Indonesia since 1941 when the former Netherlands East Indies Government placed a moratorium on extension of contracts.

Then came the Japanese invasion and the postwar Indonesian rebellion which overthrew the Dutch rule and created an independent nation.

Standard-Vacuum Oil Co. was hurt the most by that original Dutch ban. The company has exploratory rights to more than 4 million acres it wanted to work. Since that time Stanvac and the other two major companies, Caltex and Royal Dutch-Shell, have all tried without success to get new acreage.

Six months ago Stanvac announced it was halting all exploratory work in Indonesia and sending its exploration people to other parts of Asia. Stanvac said it ran out of prospects to explore for new oil reserves (OGJ, Dec. 9, p. 87).

Shell has far more acreage than either of the two American companies operating in Indonesia. Its holdings in Java, Sumatra, Kalimantan (Borneo), Sulawesi, and Ceram amount to almost 14 million acres. Stanvac has 1,845,000 acres all in Sumatra, and Caltex has about 1 million acres, also in Sumatra.

Stanvac's production is slipping about 2,000 bbl. daily each year. Shell's output is stable at slightly more than 100,000 bbl. daily. Caltex has supplied the big increases in the country's oil production from its prolific fields in central Sumatra where a $50-million expansion program for a new 30-in. pipeline will add two new fields to production.

Caltex now produces about 150,000 bbl. daily and Stanvac from 50,000 to 60,000 bbl. daily under "normal" conditions. Shell's production has been sharply cut back for the past month by a shutdown of operations in Borneo where rebel aircraft bombed the company's installations.

Petrochem Scandal Is Exposed

. . . by new Venezuelan junta, but work will continue at big project. Official says building program too costly.

THE Venezuelan Government's huge still-unfinished petrochemical complex at Moron has emerged as one of the biggest scandals of the recently overthrown dictatorial regime, but it will be completed.

In a cautiously worded report released in Caracas last week, the Government said $134 million has already been spent at Moron. Another $27 million is yet to be paid on existing contracts. A new budget calls for spending another $30 million in further work.

Here's what Venezuela has to show for the money spent so far:

. . . **A 3,000-bbl. daily pilot-plant** refinery.

. . . **A German-built chloric - soda plant** with an annual output of 10,000 tons of chlorine and 11,200 tons of caustic soda.

. . . **A series of Italian-built synthetic** fertilizer plants. Original plans called for an annual output of 150,000 to 200,000 tons of nitric acid, sulfuric acid, ammonium nitrates, ammonium sulfates, urea, and superphosphates. Actual current output of these units was not disclosed.

. . . **A 43-mile, 12-in. natural-gas** pipeline to move gas from Guacara to Moron.

Dr. Arellano Moreno, new head of Instituto Venezolano de Petroquimica, indicated last week that more could have been done at less cost if the program had been administered in better form.

When the new board of directors appointed by the ruling junta took over in February, they found claims of indebtedness totalling $50 million against Petroquimica. These have been cut to the $27 million figure recognized by the new management.

Last week's report said the claims were marked by a "multitude of faults." The report admonished that "one must discard the point of view that when one is dealing with public funds, one must proceed in a spirit of festivity."

One item which the new board found particularly distressing was a $900,000 residence for the president of Petroquimica.

Refinery output . . . The 3,000-bbl. daily refinery is operating on Barinas royalty crude supplied from the newly completed Socony-Sinclair pipeline to Puerto Cabello. The plant is producing 1,100 bbl. of gasoline, 420 bbl. of kerosine, 772 bbl. of Bunker C, and 335 bbl. of asphalt daily.

Early this month Petroquimica offered the refinery output for sale and

posted product prices. The 8.60 cents per gallon posted price for regular gasoline is more than 1-cent below posted Caribbean prices. Premium is being produced at the refinery, but it is being reserved for government vehicles.

The refinery is not in full operation yet, but even if it were it is not likely that its gasoline production would make much of a dent in the estimated 40,000-bbl. daily gasoline demand for Venezuela for this year.

Petroquimica is considering building a crude line from the old abandoned El Mene de Acosta field to Moron to supply the refinery. The field, returned to the government in 1942 as depleted by North Venezuelan Petroleum Co., is about 85 km. northwest of Puerto Cabello.

A year ago the ministry of mines and hydrocarbons contracted to have some of the old El Mene de Acosta wells worked over in an attempt to rejuvenate the field.

Mitsui Enlarging

petrochemical facilities. Completion is due in 1959.

MITSUI Petrochemical Industries, Ltd., Tokyo, is taking another step toward expansion of its major petrochemical complex at Iwakuni, Japan.

Mitsui signed with Standard Oil Co. (Indiana) for a xylene separation process and with Atlantic Refining Co. for a xylene isomerization process. The integrated operation designed by Scientific Design Co. will produce a high yield of para-xylene from a mixed xylene charge.

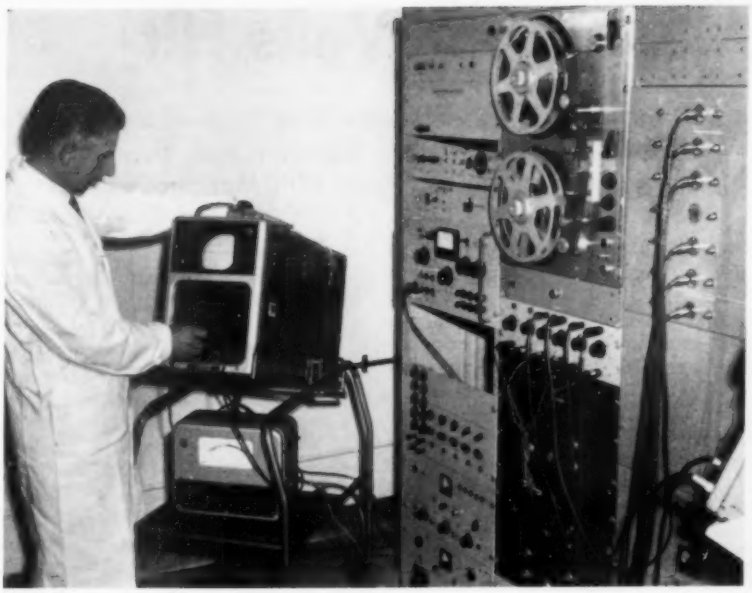
These facilities, scheduled for completion in 1959, supplement others recently completed and under construction. Earlier this year Scientific Design built ethylene oxide, ethylene glycol, and cumene plants for Mitsui, and is currently constructing a terephthalic acid plant.

Product of the Indiana process will be primarily ortho-xylene, meta-xylene, and ethyl benzene.

Atlantic's Octafining process will convert these C_8 aromatics into para-xylene. It is a catalytic process operating in the presence of hydrogen.

It increases the yield of para-xylene from some 18% of the charge to 60%, the process continuously recycles the hydrocarbon stream from the isomerization process to the separation unit.

Production of para-xylene is expected to reach 11 million pounds per year. It is an important intermediate in the manufacture of synthetic fibres such as dacron.



BP Gets New Research Facilities

BRITISH PETROLEUM CO. has moved its exploration and production research laboratory into new quarters at Sunbury-on-Thames, 20 miles from London.

BP uses the lab to study all sorts of problems, dealing anywhere from fossiliferous spores to high-pressure-gas and oil separation at the wellhead.

The laboratory is the only one of its type in the British Commonwealth, and it works closely with BP field operations. Facilities on hand include such equipment as instruments for seismic records taken on magnetic tape (photo).

One chore of the laboratory is to improve and test instruments used in the field. Equipment under study can be shaken, frozen, heated, and checked for the ability to withstand fungus growth and high humidities.

A special project at the moment is the development of a gravity meter to go down a deep well. If and when the instrument is perfected, it should extend the range of deep observations, and improve accuracy of surface work.

Japan Puts Ceiling on Refinery Runs

THE JAPANESE Government put a ceiling on refining operations last week for the first time to avoid an overflow of crude imports.

The new restriction limits Japanese refinery runs to 267,000 bbl. daily—244,000 bbl. daily for domestic consumption and the rest for export. The government order will limit runs until the end of September. Japanese refiners are now operating at only about 50% of capacity.

At the rate crude imports are going into the country, by October there will be 1 to 2 million barrels on hand for which no storage facilities are in sight.

The oversupply will be caused by an increase of crude stocks from the present of 6.3 million barrels to 11 or 12 million barrels in the next 4 months. Japan has tankage for 13.3 million barrels of crude, with maximum storage of 9.5 million barrels. Another 400,000 bbl. capacity of tankage under construction won't close the gap.

The bind is resulting from overchartering of tankers during the Suez scare, and by a failure of demand to follow the steep upward curve plotted by economic planners.

The ministry of international trade and industry was allocating foreign exchange to pay for crude imports of 273,000 bbl. daily. But tankers were bringing in 290,000 bbl. daily, or 17,000 bbl. daily for which there is no exchange allocation.

Independent refiners are carrying the burden of financing the unprecedented crude stocks. They are trying to postpone tanker arrival schedules—and persuade the government to increase foreign exchange allocations.

Maracaibo Wells Hit

. . . giving flush new Golden Lane 22 producers. Sun's is the lake's best so far. Superior well flows 10,000 bbl. daily. San Jacinto finals fifth Marlago well.

PRODUCTION from acreage held by newcomers in Lake Maracaibo is beginning to be felt and the new companies are drilling new wells just as fast as they can make hole.

Three more flush wells, two of them testing more than 10,000 bbl. daily, were added last week to the already 10-mile-long Golden Lane producing trend in midlake.

Production from this trend, plus a small new block in eastern Maracaibo, already totals more than 50,000 bbl. daily.

Golden Lane . . . Venezuelan Sun Oil Co., operator for the three-company combine which holds the central lake Block 1, has completed a new well which tested 10,360 bbl. daily.

This well, SVS 12, is the best yet reported in the lake, but only slightly better than a 10,271-bbl. test made a few days earlier by Superior Oil Co.

The latest central lake completions give the trend, dubbed a new Golden Lane in Venezuela, at least 22 wells. The Sun - Atlantic - Texaco Seaboard group has 10 in the northern quarter of Block 1. Superior has 10 in its Lama block of national reserve acreage just to the north of Block 1. Creole has completed at least two more in its old acreage offsetting Superior to the north.

Both the 10,000-bbl. wells were dually completed in the Eocene. Sun said last week SVS 12 tested 5,200 bbl. daily from an upper zone from 9,090 to 9,385 ft. and 5,150 bbl. daily from an interval between 9,415 and 9,570 ft. The crude was 31.5° gravity. Both tests were made on ¾-in. chokes.

To the north, Superior completed Lama 10 dually with the upper zone from 9,080 to 9,338 ft. testing 5,346 bbl. daily. The lower pay, 9,452 to 9,525 ft., tested 4,925 bbl. daily. Both tests were on ¾-in. chokes and the crude ranged from 31.9° to 32.4° gravity.

The other Sun-Atlantic-Texaco Seaboard well, SVS 11, was completed to the northeast of No. 12. It tested 5,280 bbl. daily of 36.5°-gravity crude through a ⅝-in. choke from 7,740 to 7,940 ft.

The group's wells are all in the northern quarter of its big lake block. They are drilled on slightly less than 80-acre spacing in roughly parallel southwest-northeast lines. The farthest to the south is outside the grouping and is SVS 1, the discovery.

To the east on a small block of national reserve acreage offsetting Mene Grande's Ceuta field, a group of newcomers headed by San Jacinto Oil Co. completed its fifth Marlago well. It tested 3,768 bbl. daily of 25.7°-gravity crude.

San Jacinto's partners are Union Oil, Murphy Corp., Monsanto Chemical, Tennessee Gas Transmission, American Petrofina, and Sharples Oil.

The production . . . The production is already being felt in Venezuela where about 400,000 bbl. daily of older oil is shut in because of depressed market conditions.

The newcomers are pressed for markets for their crude in order to try and pay out top bonuses for the flush lake acreage. All are hampered by U. S. import restrictions, but all are moving at least some of their crude.

Early in June, Superior was producing 30,000 bbl. daily from its Lama field. San Jacinto produced 8,800 bbl. daily early this month from only three of its five wells at Marlago. Sun is barging 12,000 bbl. daily to Cabimas where it is delivered to Creole Petroleum. Sun then takes an equal volume from Amuay.

Thailand Plans Shale Project

THAILAND, one of southeast Asia's new independent countries, may soon be supplying some of its own fuel needs from oil shale.

Plans now are for a joint development of a 19-mile oil-shale outcrop by a Thai company in partnership with Japanese. The shale deposit is estimated to contain 2 billion tons of shale with a 26% oil content.

The shale outcrop is near Mae Sot in extreme western Thailand along the Burmese frontier. Present plans call for a joint company to be formed by Thai Shale & Oil Co. and Japan Overseas Technical Cooperation Association. The latter is a nonprofit group organized by Japanese heavy industries to aid Asian countries and boost Japanese trade.

6,000-bbl. plant . . . The Japanese plan to supply $16 million in equipment for a 6,000-bbl. daily shale-oil plant with the Thai interests supplying another $8 million in capital from a United States loan. The plant would be built at Mae Sot.

Promoters of the project say the plant would produce 3,100 bbl. daily of gasoline in addition to fuel oil, propane, and coke. The products would be marketed in Thailand with possibly some exports to neighboring Laos.

Thailand has no oil or coal. It depends entirely on imports for its energy requirements.

Last week the whole deal hinged on approval of the plan by the Japanese Government, building the last 60 miles of road from Tak westward into Mae Sot, and negotiating the loan from the U.S.

The Thai company is headed by Marshal Sarit Tanarat, who heads Thailand's army. One of the directors is Thanom Kittikhachorn, Thailand's prime minister.

The Japanese association is headed by Hidesaburo Kurushima, president of Dowa Mining Co., and an old hand at shale-oil operations. Kurushima directed the Southern Manchurian Railway's Fushun shale project during World War II and supplied more than 60% of Japan's military oil products during the early days of the war.

Sumatra Oil Moves

to Japanese refinery. Deal involved agent of U.S. firm.

THE FIRST shipment of crude exported from North Sumatra's oil fields since before World War II was unloaded last week at the 37,500-bbl. Shimotsu refinery of Maruzen Oil Co. in Japan.

The small Japanese tanker carried about 13,250 bbl. of the 46°-gravity crude. Maruzen, an independent Japanese refinery said last week this is a "trial shipment."

There was still just a bit of a mystery last week as to the identity of the seller. Tokyo sources said the oil was purchased by Fuji Kosan, a well-known oil-trading company, from Harold Hutton, identified as representing an American company. The crude was then consigned to Kita Nipon Sekiyu, a Maruzen affiliate.

Fuji Kosan paid $2.05 per barrel f.o.b. Pangkalan Susu. This is more than 80 cents under the posted price for Indonesian crude of a similar quality produced by established companies in Indonesia.

When the 2,000-ton Japanese tanker left Pangkalan Susu with the crude, officials of Edgington Oil Refineries, Inc., Long Beach, said they had no information on the shipment. Edgington said early this year he had signed a contract to finance the job of putting the old North Sumatra fields back in production and would take the output for the next 2 years (OGJ, June 9, p. 82).

The North Sumatran oil fields were never returned to the Royal Dutch-Shell Group by Indonesia after the war when other producing properties were restored to private companies. A few months ago the government formed a new company, Indonesian National Oil Wells, Ltd., to produce the fields.

England Has Deep Find

A DISCOVERY in the British Midlands has found oil sands deeper than in any field in England.

The well in Lincolnshire is about 18 miles north-northeast of Egmanton field. It caught the drilling crew by surprise by flowing crude and sand from a break in the pipe during a packer test at 4,400 ft.

The operations manager in the area for BP Exploration Co. said the find appeared to be worth exploiting. The crude came to the surface with enough force to be caught by a high wind and damaged a nearby cornfield. There was no damage to the rig.

The test was being made just after the well passed through the coal measures. Most of the 1,700-bbl. daily production in the Nottinghamshire area to the southwest comes from Millstone Grit underlying the coal formations.

In Nottinghamshire, however, the sandstone series generally lies from 1,914 ft. to 2,643 ft.

Platform Ordered

by Italians for Persian Gulf drilling venture with NIOC.

A SECOND three-legged drilling platform is slated to test the waters of the Persian Gulf.

The Italians have contracted with R. G. LeTourneau, Inc., for a $1-million marine drilling unit to test the acreage off Iran in a joint venture with National Iranian Oil Co. The platform is scheduled for delivery in 5 months and will be towed to the Persian Gulf at a cost of $125,000.

The first LeTourneau platform built for Middle East drilling arrived in Ras Tanura last month and is now being outfitted by Arabian American Oil Co. for development drilling at Manifa (OGJ, May 19, p. 117).

The new contract with the Italians was announced by R. L. LeTourneau, vice president of the Longview, Tex., firm. The platform is being built for SAIPEM, a subsidiary of Ente Nazionale Idrocarburi, the Italian Government oil agency headed by Enrico Mattei. SAIPEM will hold the Italian 50% interest in SIRIP, the joint venture with the Iranian Government company.

The Italian platform's triangular hull will measure 120 by 115 ft. and will be 13 ft. deep. This is larger than the platform built for Aramco but smaller than previous LeTourneau designs for drilling in the U. S. Gulf Coast area. The platform will be operated with a tender, a converted LST now being outfitted in Genoa, Italy.

LeTourneau said construction will begin immediately at Vicksburg, Miss., with many of the steel components fabricated at the Longview plant.

The portable platform will be the third to be used in the Persian Gulf. In addition to the Aramco unit, a joint French-British company has a DeLong-type barge now drilling a deep test off Abu Dhabi in the southern waters of the gulf.

Caltex Opening Port

in central Sumatra to move crude from growing fields.

A BRAND-NEW oil port will ship out its first crude next month when Caltex opens Dumai terminal on the east coast of Central Sumatra.

The port will initially move 20,000 bbl. daily taken from a 30-mile, 30-in. pipeline from Duri field. When the company completes its multimillion-dollar expansion program, Dumai will become a major oil port.

Caltex will eventually ship most of its Central Sumatran production from Dumai. This will include production from Bekasap and Minas field. Bekasap, now shut in, will be linked to nearby Duri with a 14-in. line (OGJ, Apr. 1, 1957, p. 98).

A line also will be built from Minas, 30 miles to the southwest. The field now accounts for all of the company's present Indonesian production of about 160,000 bbl. daily It has produced as high as 182,900 bbl. daily. The crude is presently taken out by a 12-in. pipeline to Perawang terminal on the Siak River. From Perawang, river tankers take the crude down stream to Paking ocean terminal.

A full-scale drilling program has been under way in Duri during construction of the pipeline. Pay lies at less than 1,000 ft., but the field lies in 2 to 6 ft. of water making drilling difficult.

The terminal will be able to handle the heaviest tankers. Housing, tankage, and other facilities for a full-scale port have been built.

Deep Venezuela Well Tested

RICHMOND Exploration Co. (Standard of California) has apparently established the deepest commercial oil production in Venezuela in a remote well in western Zulia.

Richmond's 36-E-2 is still testing Cretaceous pay which yields 31°-gravity crude from below 15,600 ft. Initial drill-stem tests of the well flowed 3,290 bbl. daily on a ⅜-in. choke. A later production test produced slightly less than 1,900 bbl. daily.

The well is 24 miles due west of Matapalo on the western edge of Lake Maracaibo and about 30 miles southwest of Richmond's Boscan field. It is about 5 miles north and 2 miles east of the town of San Jose.

The company completed 36-E-1 just to the south of the new deep well in 1948, but it tested 13°-gravity crude from a much shallower pay. The first well is not in production.

SOVIET DITCHER cuts long swath and . . .

CLEANING and priming machine moves along 2,315-mile route as . . .

Russia Starts Work on Huge Crude Line to Asia

RUSSIA'S longest pipeline is under construction from the Volga River to Lake Baikal, deep in Siberia.

The 2,315-mile, 28-in. Tuimazy-Omsk-Novosibirsk-Irkutsk system will carry crude from European Russia to consumption centers in Asia. Spreads are already moving across a 250-mile route through the steep slopes of the Ural Mountains. The TONI route continues across the marshes of the West Siberian Plain. Crossing of such north-flowing rivers as Belaya, Irtysh, Ob, and Yenisei will all be buried. The line is being buried its entire length at 6½ ft. Thirteen pumping stations will be installed.

The Russians, who use conventional ditching, coating, and wrapping methods, claim to be welding pipe with automatic welding machines. In the U.S., all pipeline field welding is done manually. Automatic machines are used on a small scale in double jointing yards to weld two sections, which are then strung along the right-of-way and welded manually.

WORLD BRIEFS . . .

The Japanese moved a step closer to winding up a Neutral Zone offshore concession last week when they got the official blessing of the British Government. Japanese Arabian Oil Co. has already signed a final agreement with the shaikh of Kuwait. Under the terms of an 1899 treaty, Kuwait must have the approval of its protector, the British, for any lease of its territory. An agreement with the British was signed in London's foreign office by Sir William Hayter, deputy under secretary, and Katsuo Okazaki, acting for the Japanese company.

The Far East's first catalytic reformer, a 3,000-bbl. Houdriformer, went on stream last week at the 25,000-bbl. Yokkaichi, Japan, refinery of Daikyo Oil Co. The new unit is producing high-octane gasoline from paraffinic, high-sulfur naphthas from Middle East crude. The Yokkaichi plant has a 42,000-bbl. Houdriflow cat cracker which has been on stream since June 1955. Houdry Process Corp. designed the new unit. It was engineered by Refinery Engineering Co., Tulsa, and built by Daikyo.

Jamaica will be supplied by a 2,300-bbl. refinery to be built by the government and newly formed Jamaica Oil & Chemical. The $1-million plant will open within 2 years.

The Netherlands' first synthetic-rubber plant will be built at Royal Dutch-Shell's Pernis refinery. The 50,000-ton-per-year plant is expected to open in 1960.

A 20-mile pipeline will carry fuel gas from Aden refinery to the town of Aden's power station at Hedjuff. The 6-in. line will be the third to the town from the British Petroleum refinery, along with a 16-in. fuel oil, and a 6-in. gas-oil line.

Bolsa Chica Oil Corp. has spudded its first well on a 370,000-acre block in southeastern Turkey. The well, 1 Zengilan, is the first of a series to test the holdings. Bolsa Chica is the operator and one-third owner of the concession.

A West German drilling contractor has become the first German firm to participate in Algerian exploration play. Deutsche Schachtbau, of Lingen, is drilling a projected 13,000-ft. test 250 miles south of Algiers for SN Repal.

Deutsche Erdoel-A.G. has put a new wildcat discovery in the Upper Rhine Valley near Landau on pump production. Offenbach 1 produces about 35 bbl. daily of 36°-gravity crude.

A crude pipeline will be built from Russian fields to Czechoslovakia. It is planned to relieve the burden on railroads in the face of growing shipments to the heavily industrialized satellite.

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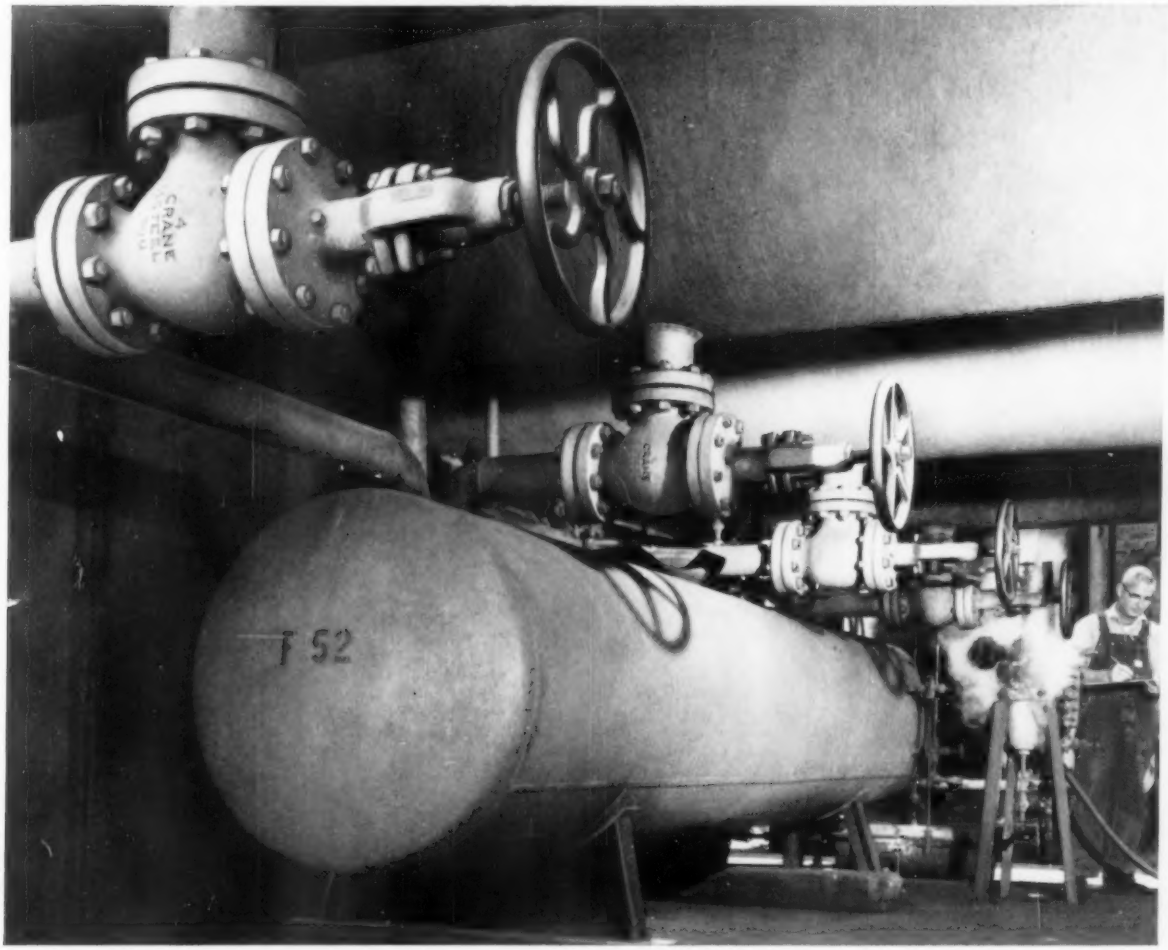

16 years on ammonia... not a penny spent for valve repairs

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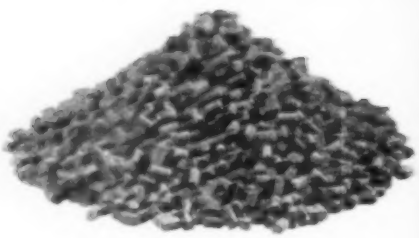
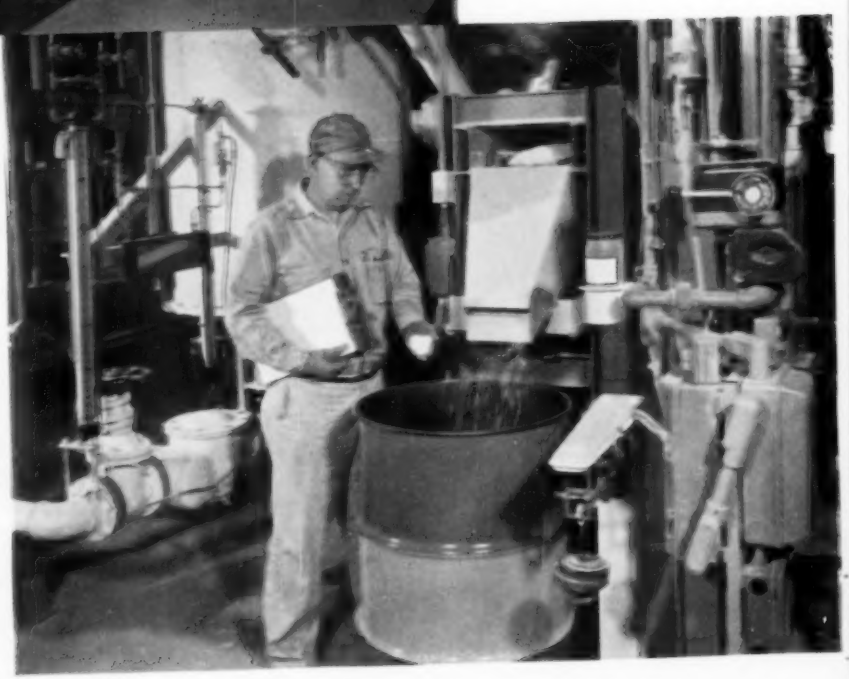
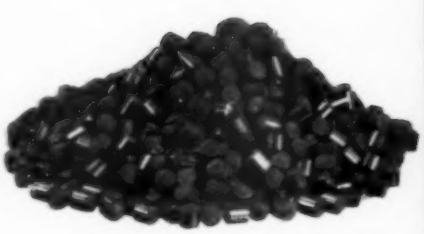




At Houdry, rigid quality control is maintained through every step of catalyst manufacture.



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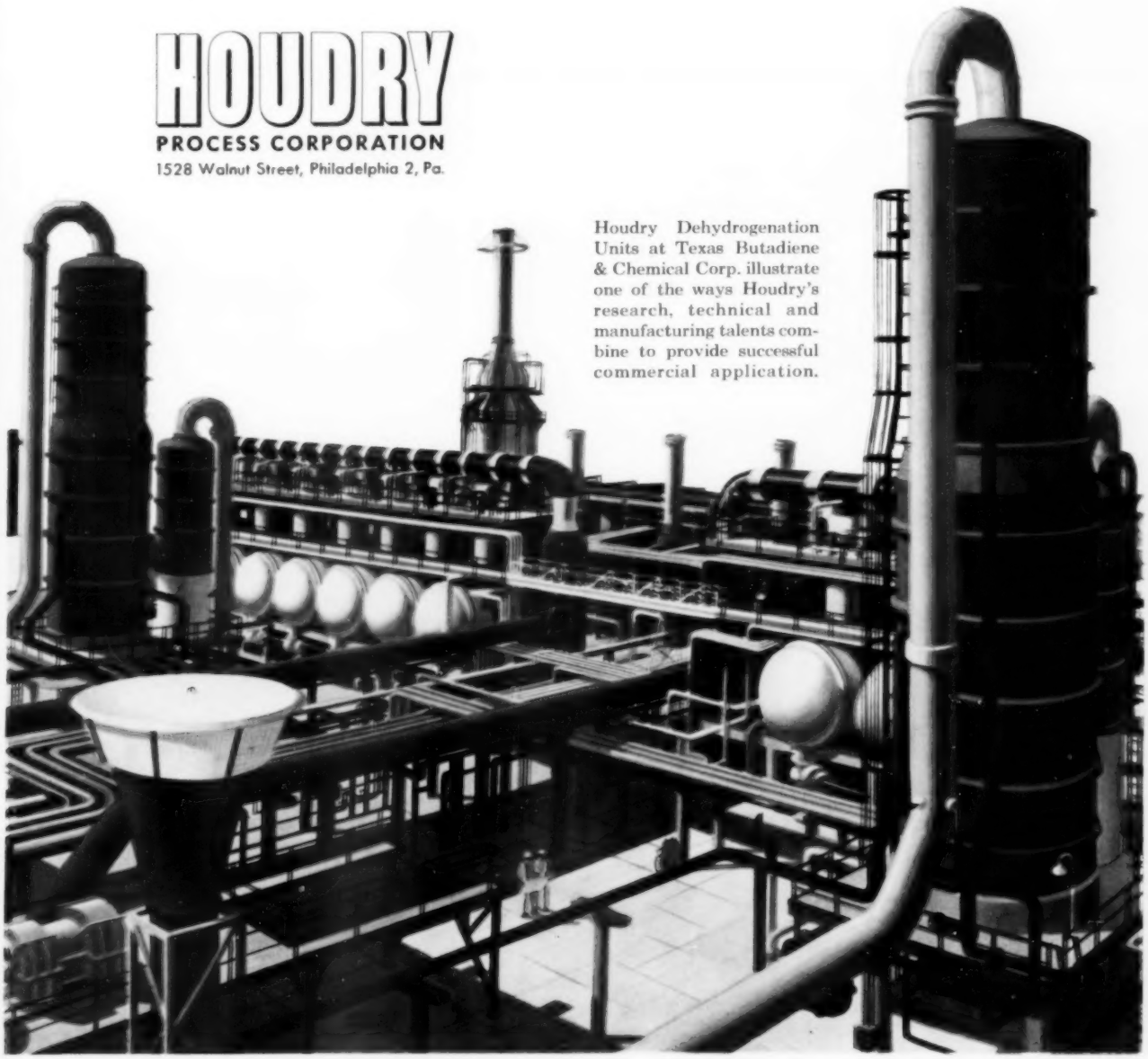

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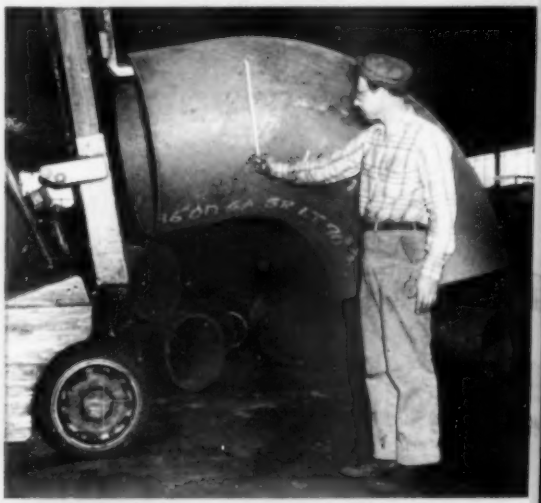
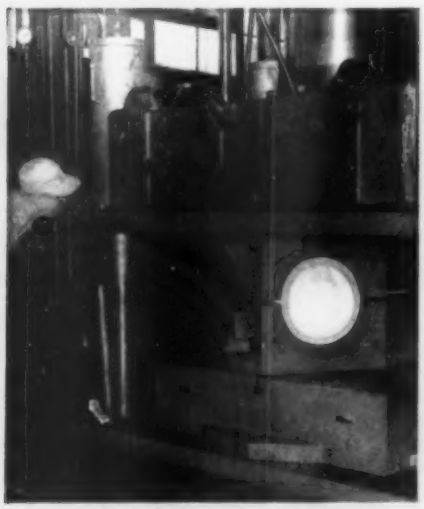
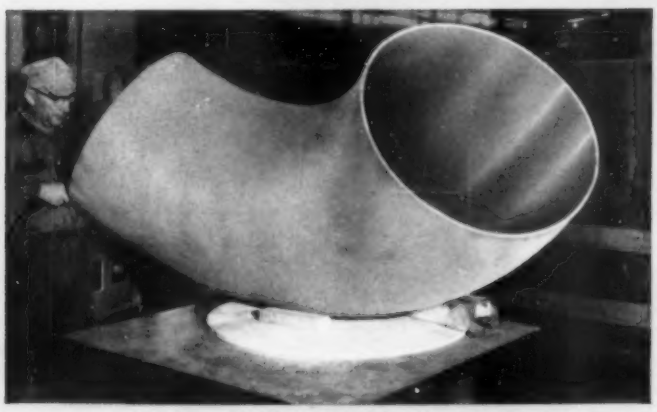


Note the exceptionally long tangent on one end of this 36" O.D. 90° short radius elbow made of special carbon steel. Similar tangent could have been provided on other end if required.



18" O.D. x 1¼" wall 90° elbows (2¼% chrome ½% moly) being sized in compression by totally enclosing dies. The exceptional dimensional accuracy that results is possible only with the Midwest process.



Interior surface of 30" O.D. stainless steel welding elbow for liquid sodium nuclear system required a finish of 125 micro-inches or better.

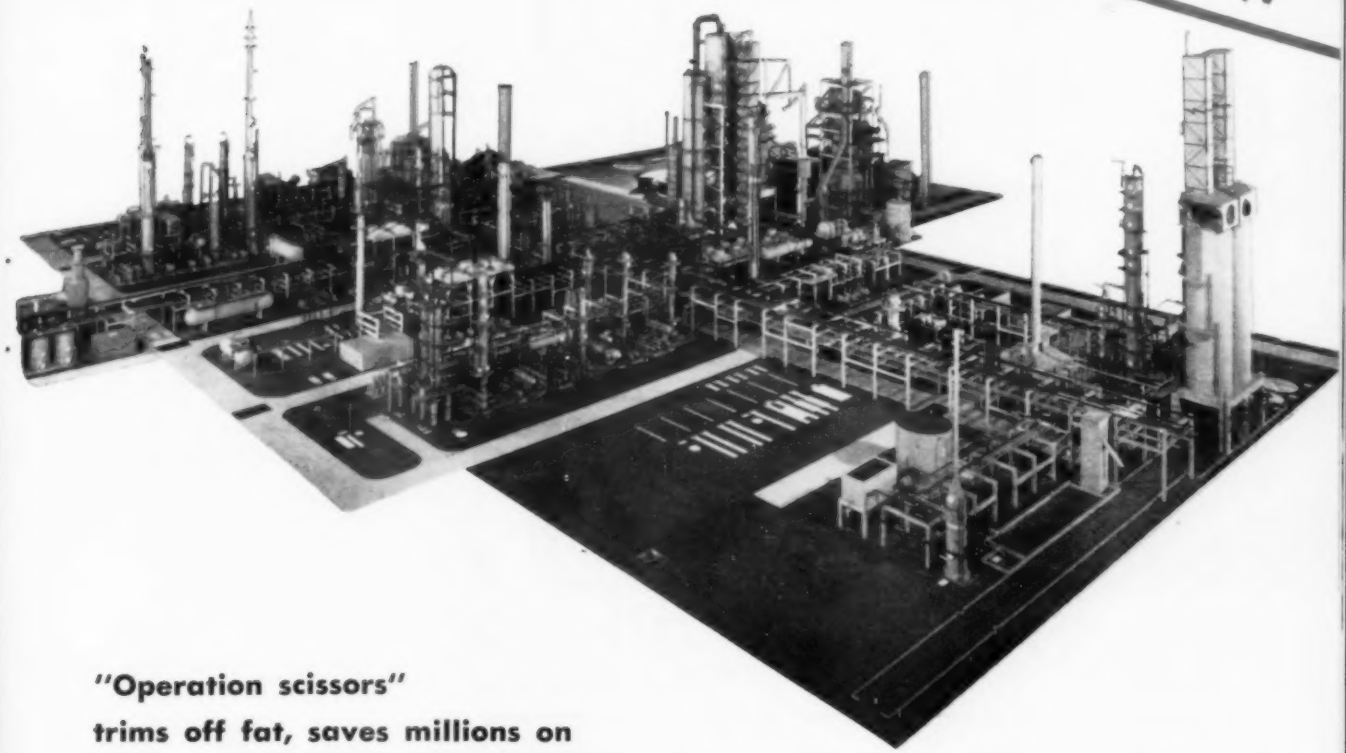
8060

MIDWEST WELDING FITTINGS

IMPROVE PIPING DESIGN and REDUCE COSTS

SPECIAL SECTION

Beginning: An eight-part article on one of the nation's newest refineries



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Result: A streamlined plant, designed specifically for today's requirements

1. Tight planning schedule met

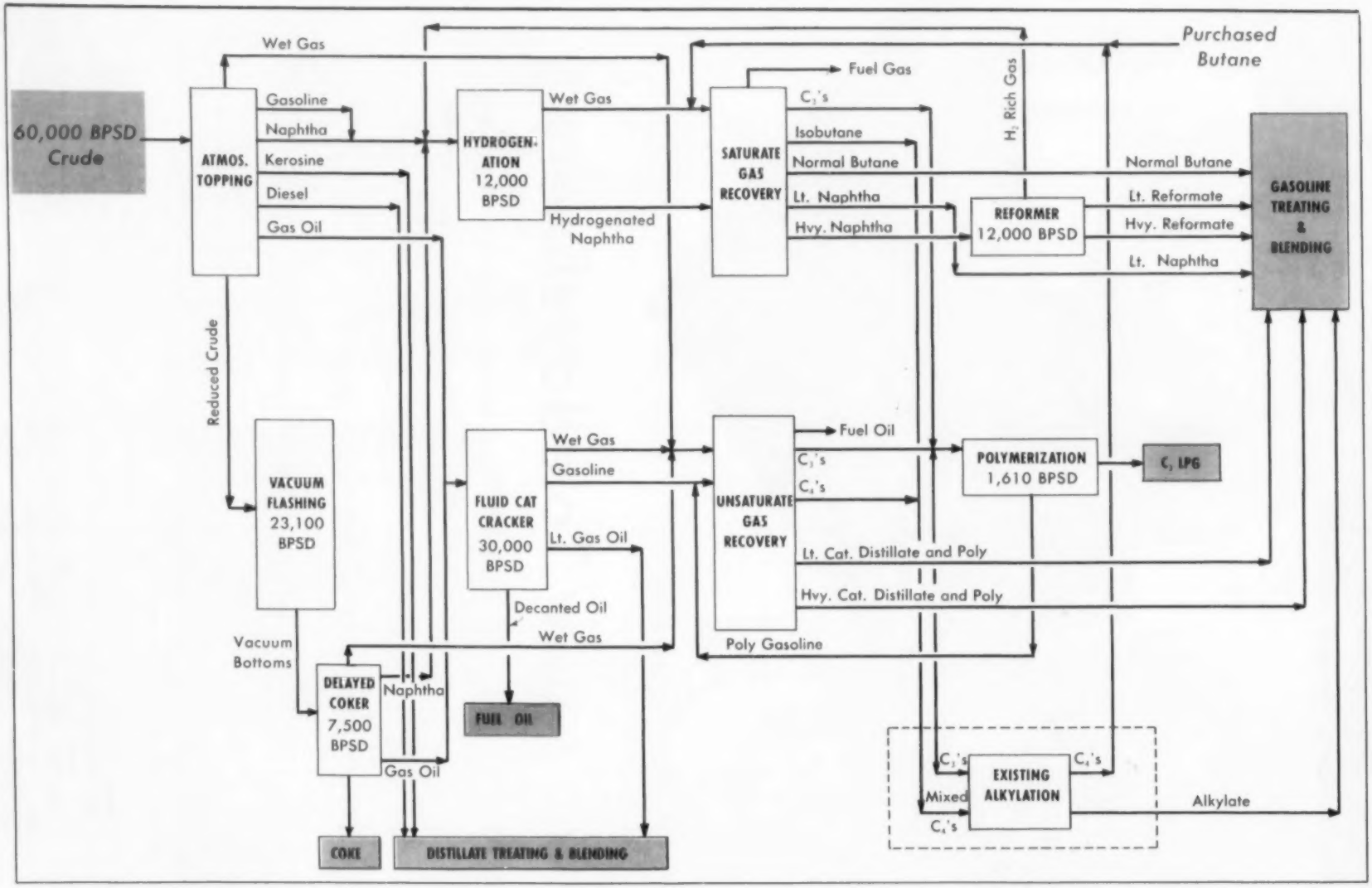
AN ESTABLISHED PRACTICE of incremental increases in refining capacity went out the window when Standard Oil Co. of Ohio decided to build its new refinery at Toledo. It will add about 25% to the company's existing crude capacity and double the capacity it had 10 years ago.

Product interchange . . . Sohio operates five refineries, four in Ohio and one small asphalt plant in Latonia, Ky., just across the Ohio River from Cincinnati. The other three Ohio plants are closely integrated by a pipeline system which permits interchange of intermediate streams and finished products. Under this favorable setup, all refineries did not need to be maintained at the same level of modern equipment.

The Lima and Cleveland gasoline refineries had seen consistent expansion and modernization. Between them, they incorporated all the processing facilities needed to meet volume and quality demand of the current market. Toledo, on the other hand, became comparatively out-of-date. About half the capacity of either of the other two refineries, it maintained thermal cracking, thermal reforming, and coking units plus a poly plant. It also had two alkylation plants which operated on feed stocks from Lima and Cleveland, as well as those produced locally.

Like most oil companies, Sohio maintains a planning function. Part of its job is to constantly evaluate future steps which will provide the marketing department with enough product of quality equal to or better than that of competitive companies.

The result of these studies usually calls for incremental increases in capacity as demand rises. New units are constantly under consideration to upgrade product quality as well. In most



A CLEAN SLATE was given Sohio's Toledo planners. Result: a closely integrated system of new processing units incorporating only one existing alkylation plant. This new refinery will meet today's product quality requirements, and tomorrow's. Beyond that, provisions are made for additional capacity.

cases these steps have been relatively small, keeping a close relationship between supply and demand.

Now and then, however, a company will find that it should take one giant step, and initiate a major building project. This was the consensus of the Sohio planning group back in 1955 when marketing forecasts of gasoline, heating oil, and other light products were compared with the capabilities and flexibility of the company's existing refineries.

Having agreed that a major building program was in order, the planning group then turned to the business of determining how best to take this step. For such a job, all functions of the company need to be considered. So, the preliminary planning brought into the group representatives of Sohio's marketing, supply and distribution, crude-oil purchasing, and transportation departments. This formal working group, headed by Dr. F. J. Sanders, was established by top management to launch detailed planning and recommend steps for the company to take.

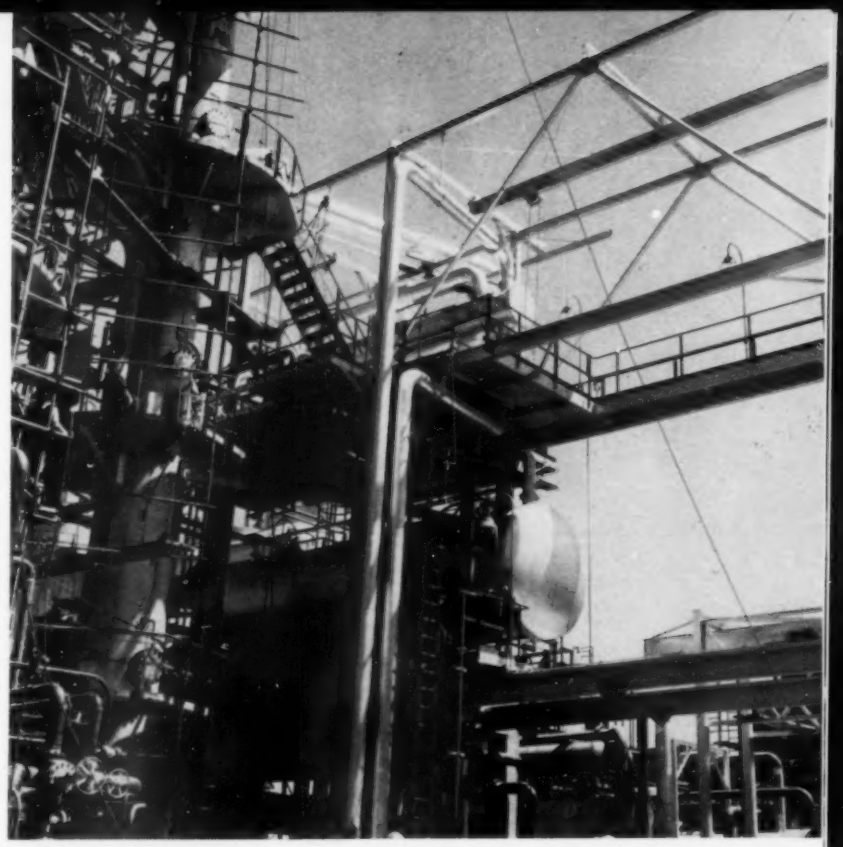
At thi. point, the Sohio planning group was faced with conducting thorough studies concerning the following phases of the over-all expansion program:

1. Location of the refinery.
2. Type and range of crudes.
3. Product mix.
4. Process lineup.
5. Selection of processes.
6. Degree of integration of process facilities.
7. Refinery size.

In such an extensive investigation, long delays to evaluate endless refinements are difficult to avoid. Sohio, however, foresaw this pitfall and arrived at an unusual decision. A tight but realistic schedule was carefully formulated to cover each of the planning phases. As a result, the project moved forward without delay although all important aspects of the planning activities were thoroughly investigated. Here's the schedule:

March 1, 1956, site selection; March 15, type of crude; March 15, determination of product mix; April 1, process lineup; April 1, process selection; April 1, refinery capacity; and April 15, degree of integration. This schedule telescoped into 6-week determinations and decisions that often require months.

To achieve this schedule required an unconventional marshaling of engineering data and manpower. Sohio formed its available engineering staff into a number of groups, each having specific areas of responsibility. It became evident, however, that additional experienced personnel and rapid access to engineering data would be required to conduct the extensive studies according to schedule. Of the possible solutions to this problem, Sohio elected to engage M. W. Kellogg Co., at this time, to complement its own staff. For a period of about 2 months, Kellogg engineers worked as a part of the Sohio team and supplied refinery material balances, estimated process investment costs, operating information and data on various crude oils. Through this combined effort, it was possible for Sohio to make sound decisions in the planning phase without a net addition to its engineering staff.



COMPROMISE ON DESIGN was used to advantage. This crude unit, as well as others, has basic corrosion protection to handle a 25% sour crude charge. Full protection for future runs on 100% sour crude can later be installed at reasonable cost.

Location . . . Site of the refinery had to be determined early in the planning. Factors involved included: marketing area, crude availability, logistics on crude and products, utilities, waste disposal, availability and cost of land, labor quality and efficiency, capital facilities required, disposal of marginal products, and utilization of existing facilities.

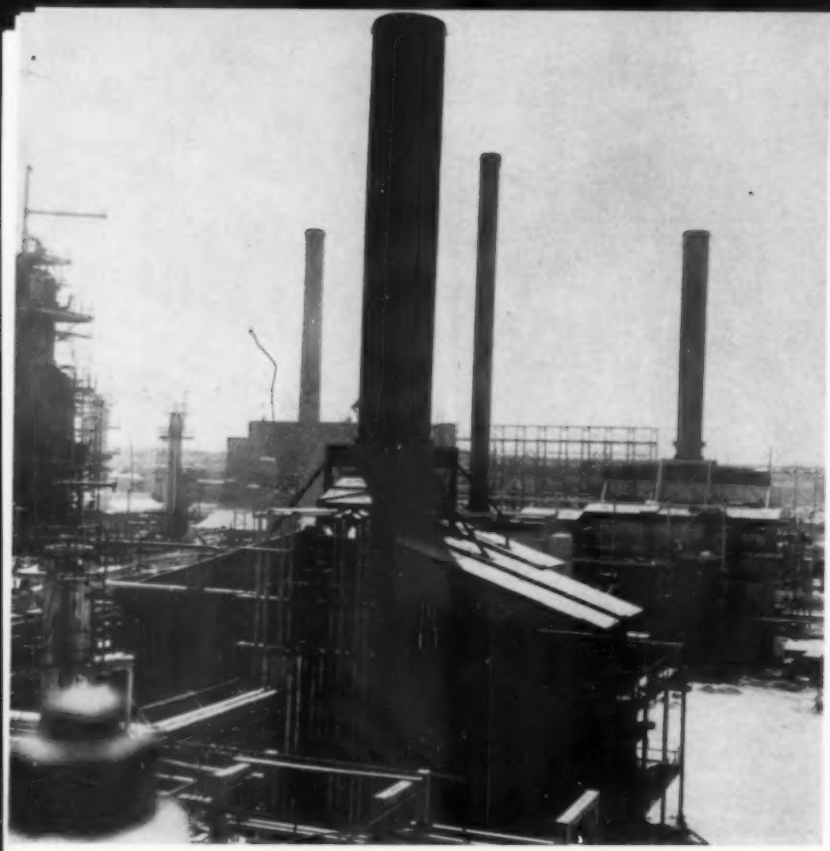
A broad preliminary study boiled the possible locations down to six; the four quarters of Ohio proper, the Gulf Coast, and the East Coast. Each was evaluated in light of the factors enumerated. Location also had to be a function of the design crude.

If Middle East crude were considered, the East Coast, Northeast Ohio, or Toledo looked good. Additional capital needed for the first two locations made those locations less attractive. For Venezuelan crude, either Gulf Coast or Toledo could be considered.

Toledo looked best for a sweet-crude refinery. In comparing the economics of a sweet-crude operation at Toledo with a sour-crude East Coast plant, crude-price differentials among many other things were considered. Toledo still looked best and the committee so recommended.

Design crude . . . Next came the matter of design crude. An exhaustive survey was made of the crudes which might be available to a refinery over the foreseeable future. Again, the decision of designing for sweet or sour crudes called for a hard-headed compromise between economy and flexibility. This led to a decision to design a plant to process a sweet crude with a gravity range of 35° to 40° API.

The plan has a qualification, however. It was decided that the plant



ONE BIG STEP in building a larger, grass-roots refinery looked better to Sohio planners than a piecemeal modernization and expansion at Toledo. The advantages include moderate cost per daily barrel of capacity in such large units as these heaters on the 60,000-bbl. crude unit.

should be capable of converting to a low-gravity, high-sulfur crude by the expenditure of more capital at a later period. In addition, the sizing of major process equipment would be controlled by the requirements of such a future charge stock.

The combination plan called for some decisions on how much corrosion protection to put in originally, and how much to leave for later incorporation. "Basic corrosion protection" was called for. This meant providing alloy protection suitable for high-sulfur crudes in towers, vessels, and other major items of equipment which would be difficult or impractical to line at a later date. Lines, pumps, exchangers, and other items would be designed for sweet-crude service, and would need additional alloy protection if and when sour crudes were introduced later.

Under the plan, designers felt that the refinery could economically process a mixture of 75% sweet and 25% sour crudes. Dsulfurization of middle distillate and H_2S removal from certain streams would need to be added. A higher corrosion rate would call for more rapid replacement of minor equipment items. Sulfur recovery might also be economically desirable.

This compromise in the interest of making invested capital do a maximum job in a given period, will cost Sohio relatively little. Basic corrosion protection added only 2% to the cost of a plant designed solely for sweet-crude processing. The same plant with wide-range crude flexibility would cost about 7.75% more than the basic sweet-crude refinery.

Size determination . . . In determining the size of a new refinery, several considerations had to be weighed. Long-range light-product demand estimates indicated that a 55,000-bbl. installation would fit the picture for the future. Some advantages would accrue to building a larger plant, namely: lower per-barrel investment, variations in demand forecast, or possible new marketing expansions. Overbuilding would also entail some disadvantages in looking at the optimum returns on investment. The 55,000 to 75,000-bbl. range was considered from all angles and a 60,000-bbl. capacity was fixed.

Residual handling . . . Having decided on the light products from the new plant, the planners then turned to residuals. Since no basic demand exists for these byproducts, they decided to process heavy stocks on the basis of over-all economic considerations.

They could make asphalt, they could produce heavy fuel oil, or they could use any one of three conversion methods: delayed coking, fluid coking, or residuum catalytic cracking. In order to study these alternates, cases were set up to meet future light-product demand. Light product was kept constant, while crude rate was varied for a wide range of crude gravities, sulfur content, and residual processing methods.

In view of all factors involved in building a new refinery at Toledo, a delayed coker, designed for the alternate of future visbreaking, was recommended for handling residuals. This will enable Sohio to take advantage of price fluctuation in the residual market.

Starting with basic recommendations for a 60,000-bbl. refinery at Toledo, to charge sweet crude initially and sour mixes eventually, the Sohio-Kellogg team then turned to the selection of process types and their interrelation.

Process selection . . . Delayed coking convertible to visbreaking was accepted for residual processing. For distillate products, catalytic cracking, cat reforming, hydrogen treating, gas recovery, polymerization and alkylation were required to make competitive products.

The economics governing selection of process types and how they are to be applied, defies generalization in refinery design. What is best for one company or location may not prove feasible for others, elsewhere. But Sohio's careful probing of all factors in arriving at the Toledo design is of interest, particularly in view of the current need for making capital investment yield best returns.

Given delayed coking, the planners decided that some modifications of the conventional process would prove beneficial. Plant tests at the existing coker at Toledo showed that greater gas-oil yields and higher quality coke would result from use of greater than normal amounts of steam, and low-pressure operation.

Hydrogen treating has become commonplace in U. S. refineries. But Sohio's new refinery incorporates it in a novel way. A conventional processing plan may have called for hydrotreating only on the reformer feed stock while chemical treating could have been used on the light naphthas. But greater economy results from hydrotreating both streams simultaneously in one large unit ahead of the naph-

tha splitter. This unit takes coker gasoline as well as straightrun product. An additional advantage is foreseen when higher octanes require light-naphtha isomerization. For this operation, feed stock must be both olefin and sulfur free.

Other process types were chosen with a view to reliability, adaptation to the particular conditions present and future at Toledo, past experience, and economics.

The same hard look at economics which has characterized choice of processing all along the line, applied to heat conservation in the cat cracker. The hot gases from the regenerator have a fuel value of about $1,000,000 per year. Carbon monoxide in these gases is burned in a boiler generating 600-lb. steam. This supply plus a smaller conventional boiler needed for startup, furnished entire refinery needs.

A new departure in gas handling was followed in designing the Toledo plant for the future. In studying how best to fill over-all needs, planners came up with dual recovery systems: one for saturated light ends and another for unsaturates. In addition to the obvious advantages of producing higher purity propylene, butylenes, butane, etc., the system has a direct bearing on alkylation economics.

Isobutane and butylenes coming from separate systems, will be available in controllable ratios, with a minimum of normal butane diluent. This alone will boost production of the existing sulfuric acid alkylation units to 6,000 bbl. per stream day. When operating on a recovery system which combined all butanes, the capacity was only 4,000 bbl. per stream day.

Decisions on location, type of crude, product mix, process lineup, and process selection called for a "process unit" consisting of a combination crude unit, hydrogen treating, catalytic cracking and reforming, gas recovery, polymerization, and alkylation with attendant treating and blending systems. All, except the existing alkylation units, will be new.

The final decision remaining was whether to go the route of the conventional refinery or adopt integration. The substantially greater economy provided by the latter, both in installation and operating costs, dictated the answer. Sohio will put a highly economical unit on stream at a time when economy is of major importance.

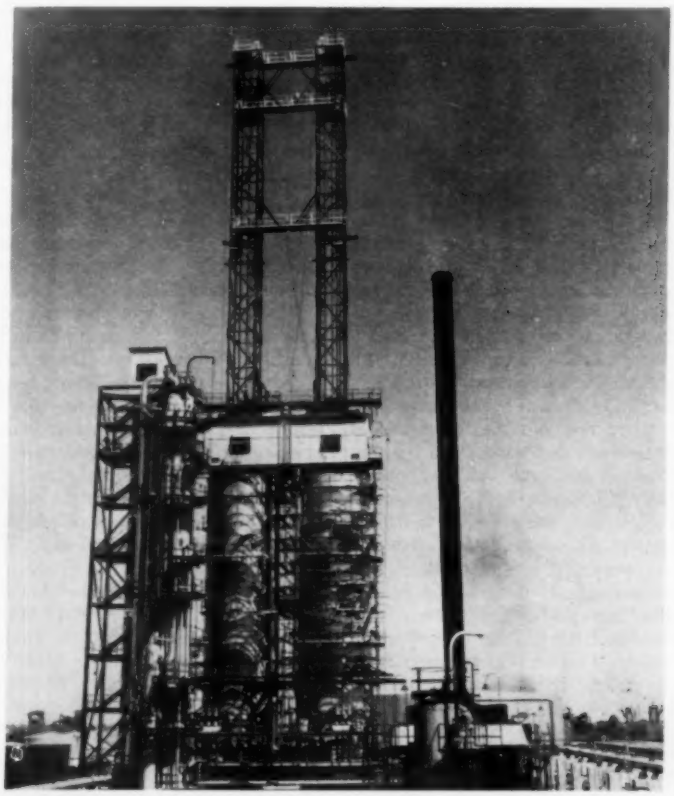
2. Integrated design means lower costs per barrel

MOST REFINERIES grow like Topsy. They are expanded and kept abreast of processing progress by stepwise additions. Seldom does a company step out and plan an entirely new, grass-roots plant.

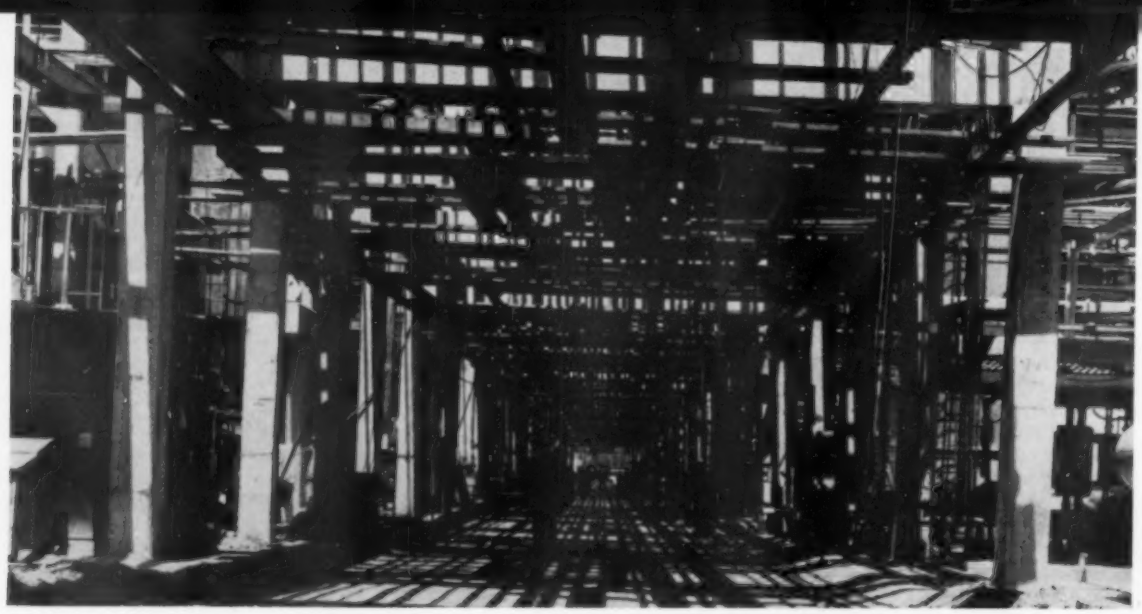
But not Sohio. Freed from "fitting" new capacity to existing units, it took advantage of its opportunity to build a grass-roots plant by taking a broad look at just how such a project should be designed.

Given the following processes—crude topping, vacuum flashing, delayed coking, catalytic cracking, catalytic desulfurization, catalytic reforming, catalytic polymerization, product treating, and existing alkylation, the planning group faced two choices. A conventional refinery could be readily designed, each unit operating independently on feed stocks from intermediate storage. The alternative was to combine all processes in a closely integrated refinery. A survey of recent grass-roots projects showed that six out of nine were designed for integrated operation. A thorough study of integration versus nonintegration at this point brought out the main reason for this trend: a lower cost per barrel. For a plant of the size Sohio planned, a conventional design would cost nearly 25% more than an integrated plant. The decision was then made to develop the Toledo project as one process unit composed of various process sections.

The biggest cost advantage of integration lies in the saving in intermediate tankage pumps and transfer lines, which would cost nearly 50% more for a conventional plant. Working capital, represented by the stocks in these tanks, would also be roughly 50% higher. Process facilities would run about 11% higher and utilities and waste-disposal investment, about 5%. In addition to capital cost advantages, integration assured a substantial operating labor saving.



FLEXIBILITY to adjust to a changing residual market governed choice of this delayed coker. Again, designers departed from convention in adapting basic coker design to meet local needs with higher gas-oil yields and better coke quality.



ELBOW ROOM for proper maintenance and operation, without going overboard on wide spacing, typifies the hard thinking that went into plant layout. This main pipe alley, shown still under construction, is a case in point.

Integration also promised heat economies in operation. Streams from one section can be charged directly to the next, at essentially their draw temperatures. This obviates cooling for storage, then reheating for the following process step. This basic rule applied: never cool a stream unless it is required by the process.

When all sections in a refinery operate as one, heat exchange can be carried out for optimum conservation of B.t.u.'s. Excess heat from the cat cracker is used in the unsaturate gas plant, poly plant, and by the incoming crude stream. Crude also picks up heat from the coker. Excess heat available from the crude-vacuum section serves the hydrogen treating and saturate gas plants. The cat reformer effects internal heat interchange to economize in alloy material. These advantages ruled definitely in favor of an integrated design for the refinery.

But this concept poses some problems. A simultaneous refinery turnaround, for instance, is more difficult to carry out than piecemeal maintenance and inspection of individual units. Another important consideration is the effect of integration on the over-all refinery stream efficiency. Through careful investigation, however, it was determined that the advantages of integration far outweighed the disadvantages. One exception to the tight process integration is the coker. This section is designed to come down separately for cleaning furnace tubes.

Process control . . . Process control in a highly integrated refinery must be centralized at a common point. A graphic panel at the control house displays all the primary instruments. But because of the size of the refinery, Sohio decided on installing six satellite control houses, to house secondary controls and provide operator shelter.

Sohio's planning group recognized that what may pass for flexibility in segregated process units is often an excuse for large "ignorance" factors and a method to boost runs well over design capacity. Management set the premise that 60,000 bbl. per day was all the capacity wanted, and all it was willing to pay for.

Flexibility in the refinery was therefore limited to necessary operational variations, range of crudes to be handled, seasonal market demands, and in some cases future operations.

Process integration, of course, required some compromise in the freedom of operating an individual unit and allows less time to compensate for upset conditions.

While the Toledo unit is one of tight design, there were limits to pinpointing all operations. There has to be some "give" or operations become difficult if not impossible. An optimum was sought to assure smooth operation without investment in "fat" that is not profitably used.

For example, the latitude required to handle various crudes ranging from 35° to 40° API precluded exact sizing of all process units. The crude tower is designed looser than other towers in the refinery. This is justified because the first "bump" from an unanticipated crude switch occurs here.

Seasonal flexibility is required to balance yields with gasoline and fuel oil demand. The cat cracker can vary from 65 to 70% conversion. In case of a cat cracker upset, coker gas-oil can be diverted to a startup tank.

Enough trays were incorporated in the cat reformate splitter to vary the cut point between light and heavy reformate, between 250° and 270° F. In the cat distillate splitter, the same latitude is possible between 300° and 350° F.

The possibility of future adjustments in operations also dictated some flexibility. Originally, some untreated virgin naphtha is blended to middle distillates and naphtha specialty products. But the hydrogen treating and cat reformer were sized to handle the total naphtha stream, should future product demand it.

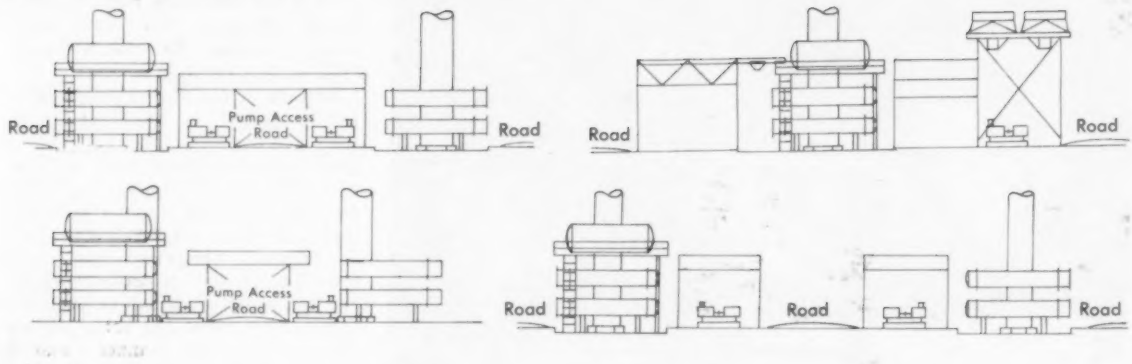
Realistic economy . . . So rarely does the opportunity arise to plan a complete new refinery from scratch, that there is a strong inclination to overdesign for the future. This was not the case with the Toledo job. In fact, Sohio's attitude of the past 3 years to design basically for present needs has proved prophetic of this year's philosophy. Today the gold-plated plant is out of fashion.

This does not imply short-sightedness in deferring work which would be more costly to add later. As needs arise for higher product quality, primarily gasoline octanes, the basic unit is planned for augmentation to meet the new requirements without excessive costs.

Careful consideration of cost control without compromising operability or safety has resulted in a tightly designed unit which is in keeping with these times of narrowing profit margins in refining. The Toledo plant should show an excellent return on its original investment.

It is significant that this modern 60,000-bbl. per day refinery is being built for $40,000,000. A cost of $667 per barrel of daily crude capacity is considered low for new refineries today.

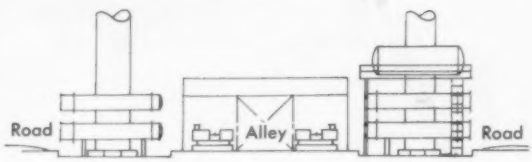
New Toledo Refinery

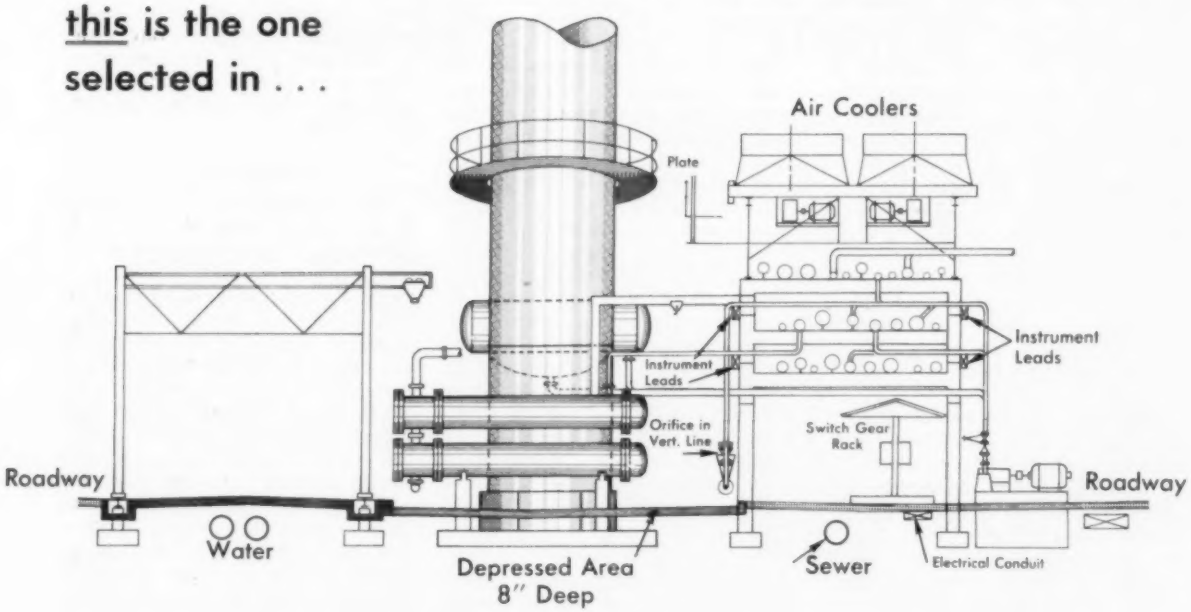


These plans were tried

but

this is the one selected in . . .





3. Designing the plant layout

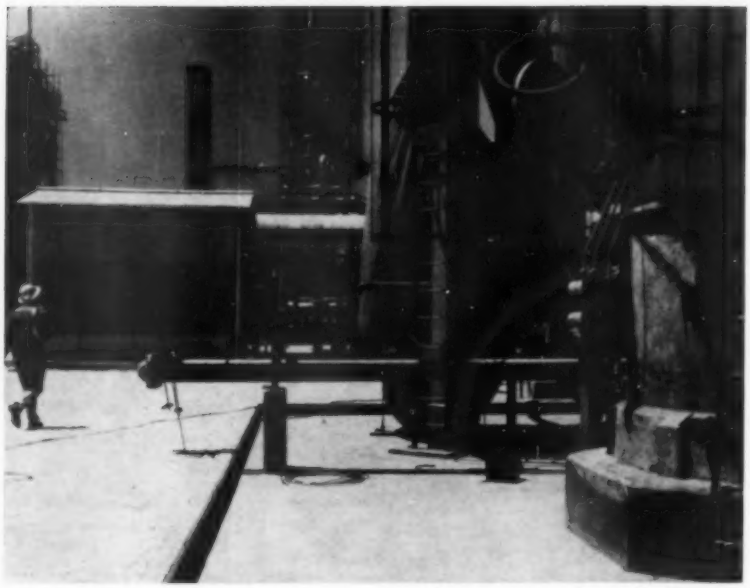
AN INTERESTING challenge faced plant-layout engineers in integrating the process section into one economical and operable unit. It meant not only an optimum arrangement within each section but a well integrated plant of all sections within the refinery. An optimum plan required consideration of the processes, operation, economics, maintenance, safety, erection, and an over-all orderly and esthetic appearance of the refinery.

The sequence of most process equipment is established by process-flow requirements. The multisection Sohio job, however, dictated that the process flow had to be maintained between sections as well as within each section and those which could be down while others were operating were to be segregated for safety.

The budget didn't win hands down in all cases. Three plans were considered for "in line arrangement" of equipment, wherein two towers and exchanger rows flank a parallel pipe bank and row of pumps.

Kellogg's scheme was the most economical in first cost, with short pipe runs, and pumps installed beneath the common pipe bank. A Sohio plan, calling for half again as much area, split the pipe banks and placed the pump rows beside them. A compromise between the two extremes was considered.

Although more costly on original investment, the Sohio plan was



LITTLE POINTS loom large in promoting better safety and good housekeeping. Note the absence of curbing to step over in sinking the site of this kerosine treater.

adopted, for three major reasons. It gave better clearance for cranes and other maintenance equipment. It provided more access roads into the unit for maintenance or emergency. An open area in the pump rows was also available for preshutdown storage of materials, or for installation of additional equipment when needed.

Although the extent of alloy piping, critical lines, and elevated equipment is established by process requirements, the arrangement of equipment to satisfy these requirements is largely a function of economics.

Before proceeding too far with the integration of the units within the refinery it was necessary to establish a common basic equipment-yard-pump-road scheme which would best satisfy all the individual sections. The next basic scheme required was one to integrate all sections into one unit.

One major plot layout problem involved locating the cat cracker with its CO boiler close to the boiler plant in order to have a boiler-plant area using common water-treating equipment and common operation. Another economic study revealed that reduced future operating costs would justify the use of many air coolers in place of water coolers. This brought into play a new type and shape of refinery equipment. Since the air coolers need no space for maintenance, they were supported above the yard bank.

It was decided also at this time that the most economical arrangement for switchgear would be to locate multiple switchgear stations within each process section rather than one large central switchgear station.

One of the items which was of primary consideration in establishing the basic plot plant scheme was the control house. Ample office space for supervisors and engineering personnel was to be provided as part of the control house. It could not be located in areas such as at coke drums or furnaces, noisy areas such as at air blowers, nor in areas subject to ground vibration which would be found near reciprocating compressors. It also had to be close to all sections for simplicity of operations and yet not be in the center where access would be inconvenient and the potential hazard to critical control equipment greater. Finally, it should be located to be adaptable for control of future process expansion.

Main "Nerve Center"

The solution is a rather unusual scheme of multiple control houses. A main "nerve center" control house was located centrally at the edge of the over-all process area. In addition, several process sections have their own small control rooms called "satellites."

Another important item in design was the location of orifice flanges. In order that they be easily accessible for adjustment, most orifice runs were made vertical with the orifice flanges easily reached from grade alongside their associated control valves.

In designing the feed-stock and product-transfer system, the procedure was to set up an entirely new layout, and then examine existing facilities to see where they might be incorporated. Cost considerations led to the decision to use as many of the existing lines as possible, adding only enough to tie in the new units. From a purely design standpoint this was a compromise, but one which was well justified, on cost control.

Because of the relatively high labor costs involved in turnarounds and maintenance work, there has been a general trend in recent years to eliminate as much manual labor as possible and also to provide more access space for all maintenance functions. Most maintenance equipment and space provided can also be used during the erection of the job which helps reduce construction costs. The Sohio job was planned in this manner, making maximum use of mechanical handling equipment. All elevated exchangers were provided with trolley beams, most exchangers at grade with full gantries for bundle removal. In order not to block road access while a bundle was being pulled, all roads were located outside the bundle-pulling area. The pump ends of all pumps were located adjacent to yard banks for minimum piping runs but access roads were located adjacent to the driver ends for simplified truck or crane access.

Railroad Access

Railroad access was a major feature in the over-all layout of the plot. In addition to a final arrangement of railroad tracks to accommodate the shipment of coke from the delayed coking unit and a spur for receiving shipments of catalyst for the cat cracker and chemicals for the boiler plant, it was desirable to make maximum use of the final trackage for erection purposes in order to minimize installation of temporary tracks for construction. With the benefit of also utilizing some existing spurs, the final track arrangement provided construction with ample short-time storage space alongside the tracks as well as free access space for a steady flow of materials directly into all parts of the process sections.

Another item designed for simplified maintenance was the cat cracker compressor and blower house. A raised-deck-style compressor house was utilized. This design permitted running all piping to the compressors and air blowers below the floor in order to leave a clear floor at the machine level for operation and maintenance. A traveling crane was provided for handling all removable sections of the machines and was designed to extend over the adjacent access road in order to drop or pick up parts directly from a truck.

Safety . . . In addition to the standard

safety precautions, two unusual safety features were used on the project.

First, all process groups of equipment containing hydrocarbons were segregated from each other in order to prevent spread of fire along the ground. The usual method applied for such segregation is to build low fire walls or curbs. Curbs or fire walls, however, do present a constant tripping hazard for operating and maintenance personnel. The Sohio job was designed with depressed areas. The immediate grade level in and around each group to be segregated was lowered 8 in. This achieved the same effect as a curb but greatly reduced the tripping hazard and maintenance problem in stepping over curbs.

Second, control air tubing, thermocouple and alarm leads to the nerve center were buried to assure an orderly emergency shutdown in case of fire or explosion.

Appearance . . . The final requirement, and one which was kept in mind during all phases of plant layout, was appearance. The finished plant will serve as a landmark. A good-looking plant also stimulates good housekeeping by the refinery personnel. Process and mechanical adjustments can always be corrected in the field but the general appearance of a plant rests predominantly with the plant layout designers at the outset of the job.

A few highlights on "layout for looks" used on the Sohio job were as follows:

1. All units and connecting roads arranged in orderly rows.
2. Similar equipment within units lined up.
3. All lines run straight down tower from nozzles without turns or offsets.
4. Minimum offsets in all piping using, where possible, flat turns at edges of yard banks.
5. Similar yard bank widths and arrangement maintained throughout all units.
6. Uniform locations for control-valve stations.
7. Maximum uniformity in location of all tower manholes along roadside centerline of vessels.
8. A functional, yet esthetically pleasing control house design.

The finished plant will represent a functional, fully integrated refinery preserving an economic balance between initial investment, operation, and maintenance.

4. Dual gas-recovery system is used

STANDARD OIL CO. of Ohio attains exceptional usage of light ends at its new Toledo refinery by virtue of a dual gas-recovery system. It is, in reality, two systems, one for saturate gas and one for unsaturate gas.

Existence of the two systems makes it possible to selectively process the various source streams for maximum utilization by components. Two of the principal advantages are:

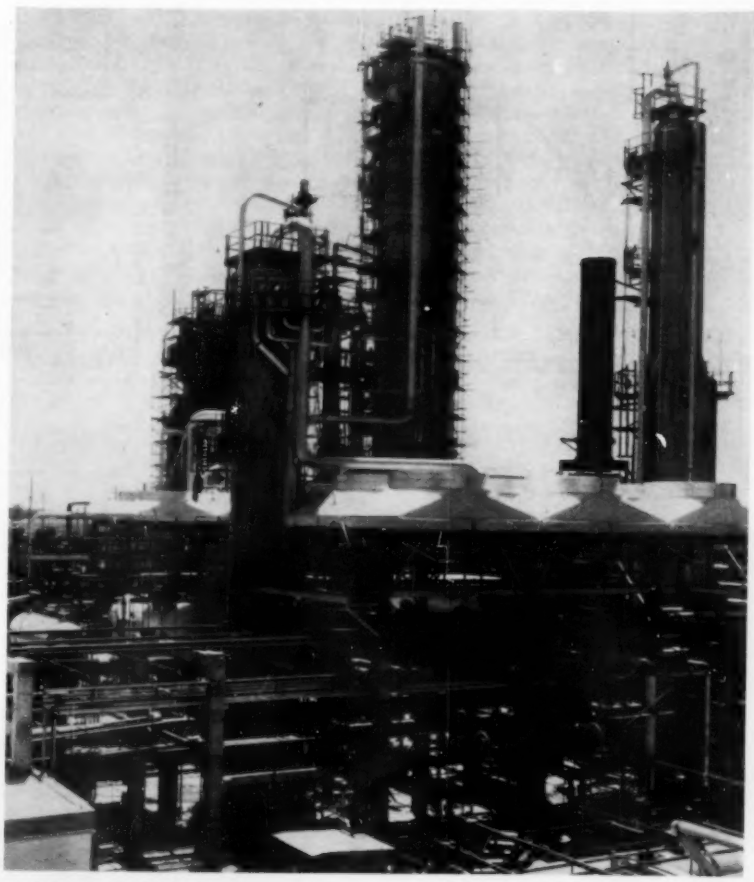
1. Gasoline blending butanes will consist of normal butane.
2. Isobutane and butylene with a minimum of normal butane diluent will supply the alkylation feed.

Saturate-gas recovery . . . This system is designed to process liquid effluent and wet gas from the hydrogenation section, net make gas from the reformer above that required for hydrogenation, wet gas and overhead liquids from the reformer debutanizer, a mixed isobutane-normal butane stream from the existing alkylation units, and a purchased C_4 stream.

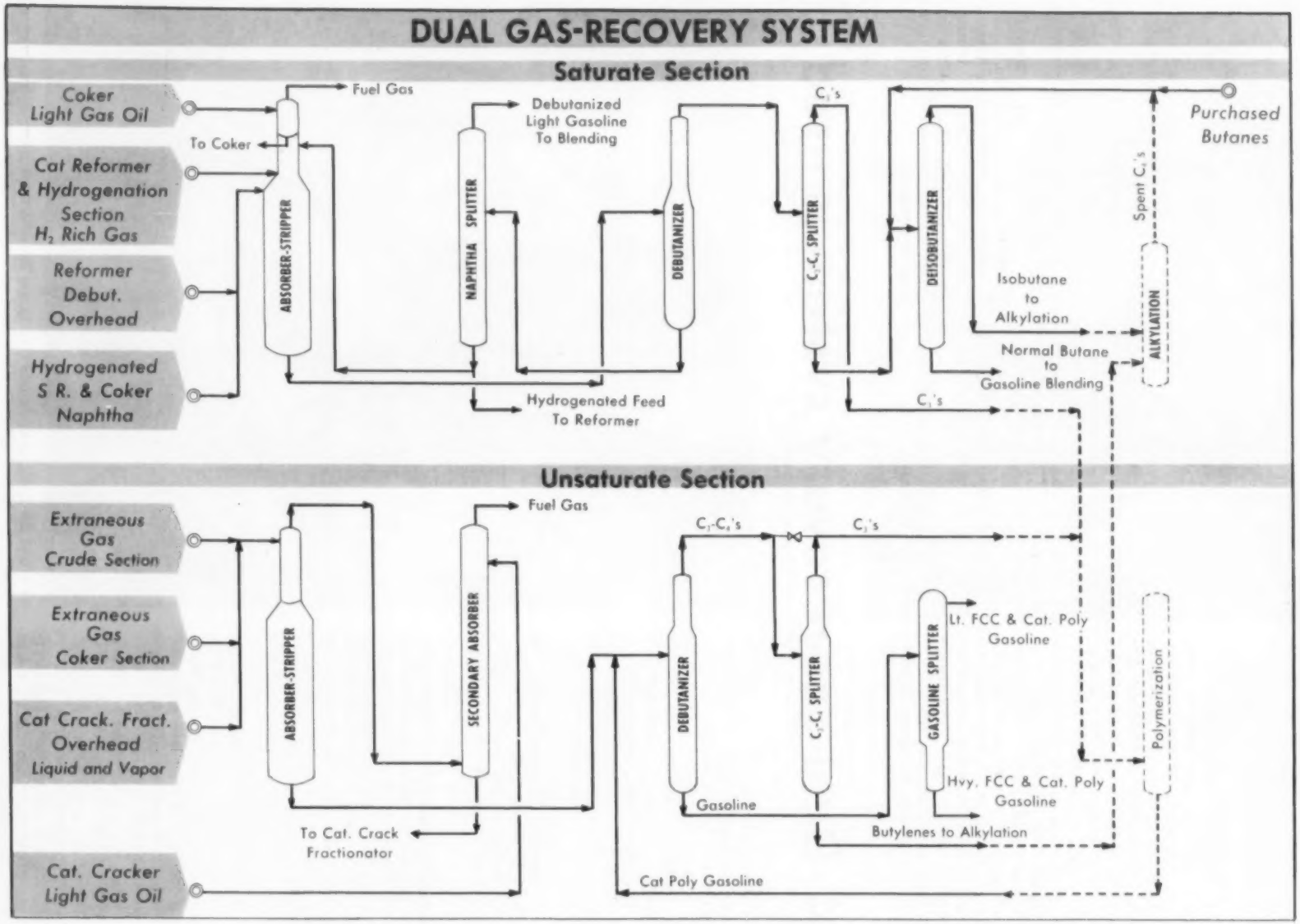
Products of the system are a hydrogen-rich dry gas, propane, isobutane, normal butane, a 200° F.-i.b.p. naphtha catalytic reformer feed and a 200° F.-i.b.p. debutanized straightrun and coker gasoline.

The system is designed to recover 95% of the butanes, not less than 70% of the propane, and to produce a C_2 product essentially free of ethane. The mixed isobutane-normal butane and the purchased C_4 stream charge is recovered 100% as a liquid.

Principal units in the saturate sys-



IN SIGHT OF LAKE ERIE, Toledo's designers chose air coolers after studying all the pros and cons of air vs. water. These units serve the unsaturate gas recovery system, with the crude section, saturate gas recovery and catalytic reforming unit visible in the background.


DUAL GAS-RECOVERY SYSTEM
Saturate Section
Coker Light Gas Oil
To Coker
Cat Reformer & Hydrogenation Section H_2 Rich Gas
Reformer Debut. Overhead
Hydrogenated S R. & Coker Naphtha
Fuel Gas
ABSORBER-STRIPPER
NAPHTHA SPLITTER
Debutanized Light Gasoline To Blending
DEBUTANIZER
Hydrogenated Feed To Reformer
C_1's
C_3-C_4 SPLITTER
DEISOBUTANIZER
Isobutane to Alkylation
Normal Butane to Gasoline Blending
C_3's
Spent C_3's
ALKYLATION
Purchased Butanes
Unsaturate Section
Extraneous Gas Crude Section
Extraneous Gas Coker Section
Cat Crack. Fract. Overhead Liquid and Vapor
Cat. Cracker Light Gas Oil
ABSORBER-STRIPPER
SECONDARY ABSORBER
Fuel Gas
To Cat. Crack Fractionator
C_1-C_4's
C_3's
DEBUTANIZER
C_3-C_4 SPLITTER
GASOLINE SPLITTER
Lt. FCC & Cat. Poly Gasoline
Hvy. FCC & Cat. Poly Gasoline
Gasoline
Butylenes to Alkylation
Cat Poly Gasoline
Polymerization

tem are an absorber-stripper, naphtha splitter, debutanizer, C_3-C_4 splitter, and a deisobutanizer.

The absorber-stripper tower receives net hydrogenation reactor effluent, vapor-liquid overhead from the reformer debutanizer, and hydrogen-rich excess gas from the reformer's high-pressure separator drum. The stripper section rejects sufficient ethane and lighter to insure that the LPG product will meet vapor pressure specifications. The primary absorber in the double absorber system uses 200° F.-i.b.p. reformer feed as lean oil and the sponge absorber uses unstripped coker light gas as lean oil.

The C_3-C_4 splitter produces a totally condensed overhead product containing a maximum of 3 mole % C_2s and 2 mole % C_4s. This product is charged to the catalytic polymerization section for treating in the cat poly feed treater and for inclusion in LPG product stream. The C_3-C_4 splitter bottoms with a maximum C_3 content of 1 mole % plus C_4s from alkylation and purchased C_4s go the debutanizer for butane separation. It produces a totally condensed overhead isobutane product, limited to 5 mole % n-butane, for the existing alkylation section. Bottoms from the debutanizer go to the naphtha splitter.

Unsaturate gas recovery . . . This high-pressure system is designed to process light ends from the crude and coking sections, the catalytic cracker fractionator overhead and depropanized gasoline from the polymerization section. The two-stage centrifugal gas compressor discharges at about 260 psia.

Products of the unsaturate system are fuel gas, C_3s for poly feed, C_4s for alky feed and light and heavy gasoline. The recovery system is designed for 80% recovery of the C_3- and 99% of the C_4s and rejection of all but 2.7% of C_2+.

The system employs absorption, stripping, and fractionation. Absorption and stripping are carried on in a combined absorber and a stripper tower. A secondary absorber treats tail gas from the absorber-stripper and sends rich oil back to the cat cracker fractionator and tail gas to the fuel system.

Bottoms from the stripping section of the absorber-stripper join with depropanized gasoline from the catalytic polymerization section and the combined stream goes to the debutanizer. The quality of the overhead stream is such that the butane-butylene product of the subsequent depropanization contains a maximum of 2 mole % C_5. Bottoms from the debutanizer contain a maximum of 1 vol. % C_4s.

The debutanizer overhead goes to a C_3-C_4 splitter. The overhead C_3 product is charged to the feed treating portion of the catalytic polymerization section for the removal of H_2S. The bottom C_4 product is charged to the alkylation section. The tower is designed for 10 mole % C_4 in the overhead and 0.5 mole % C_3 in the bottoms. A bypass to the C_3 product line is provided so that, in case of an isobutane deficit in the alkylation units, polymerization of part of the butylene that would normally go to alkylation feed is possible. This alkylation feed can always be produced at the optimum iC_4/nC_4 ratio.

Debutanizer bottoms go to a gasoline splitter which is designed for alternate operation, light gasoline of 300° or 350° F. end point and respectively, heavy gasoline of 280° or 330° F. i.b.p.

5. Gasoline-blending facilities were especially tailored

IN THE PLANS for the modernization and expansion of the Sohio Toledo refinery, considerable thought was given to the design of gasoline blending facilities. The system as engineered and furnished by Proportioneers, Inc., was selected and modified from previous applications on gasoline blending so as to fit the special needs of the Toledo project.

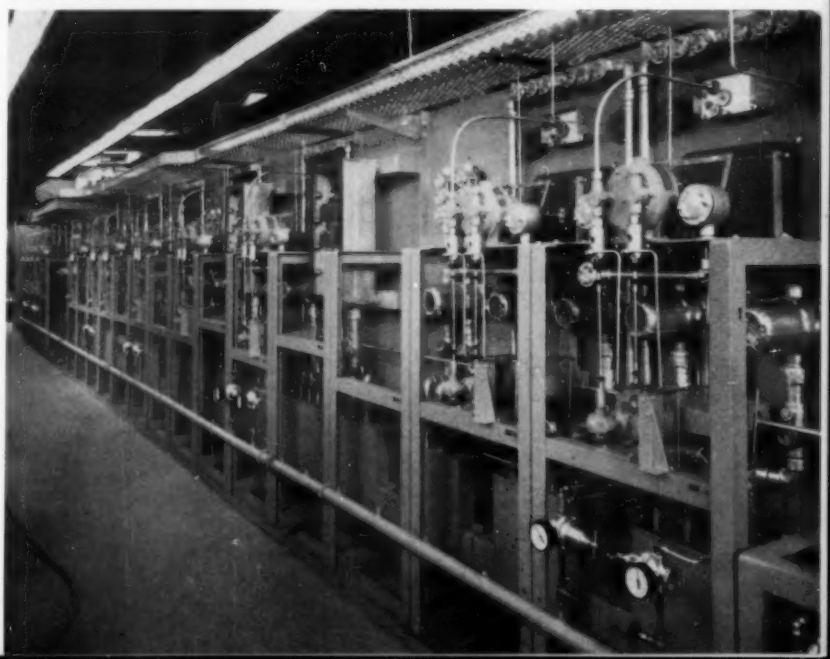
Briefly, the system provides for continuous, in-line blending of gasoline base stocks, additives, and TEL. Monitoring and control are provided so that any upset, incapable of correction, causes positive, "fail-safe" shut down.

Sohio's particular plans called for supplying three grades to pipeline for distribution to marketing plants throughout Ohio at blending rates of 40,000 to 80,000 bbl. per day. Once the product had left the refinery it had to be "on spec"; there was to be no provision made for doctoring.

In addition to this very critical requirement, management had stipulated that a blending unit must be as free as possible from operator error. There was to be no possibility of the human element incorrectly setting valves or pumps.

Starting with blender upstream or supply facilities it was necessary to first determine if each component or base stock was to be assigned to an individual panel or if a manifolded system had more advantages. In the former no valve-setting error is possible because only by energizing a

THE BUSINESS END of the gasoline blender. The realistic investment attitude prevailing in Toledo's design, called for a blender which if not gold-plated, does the job at hand practically and efficiently.



particular panel could its associated component be fed. While this arrangement is the least capable of operator error, it is the most expensive—if, for example, seven stocks are produced but only five are required in any one blend, seven panels are needed, whereas an inlet manifold system allows reducing panels to five in number. In addition, if some base stocks are required over wide percentage ranges (such as 5 to 90%) it is necessary to duplicate panels—one would cover a 20 to 90% range and the other a 5 to 25% range for single base stock—adding even more to the cost.

Sohio compromised with a partial manifold scheme where some cross-connections are provided to reduce the number of panels, to provide sparing, and to give additional flexibility of range. But each valve in the suction piping is electrically interlocked with the panel so that the blender will start only when valves are properly lined up as indicated by the supervisory lights.

Within the blender, each control loop and respective panel consists of a meter, pneumatic control valve, mechanical differential unit, percentage-setting handwheel and drive, supervisory lights, totalizers, pneumatic controller, temperature and pressure indicators.

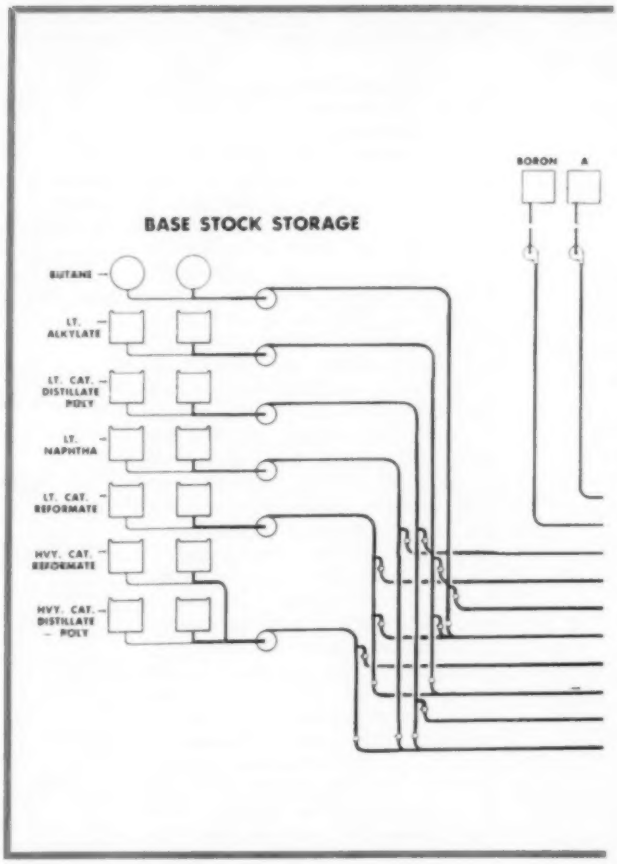
A decision was made in favor of positive-displacement meters for flow-measuring elements rather than differential meters because of greater accuracy, wider range, and lesser sensitivity to flow and pressure changes.

As a definite part of any meter system, calibration means had to be provided. Rather than using the conventional prover tanks, which made calibration possible only when blending is not going on, a calibration loop was designed to allow calibration of any meter at any time during the blender runs. In this way checks are made under actual operating conditions.

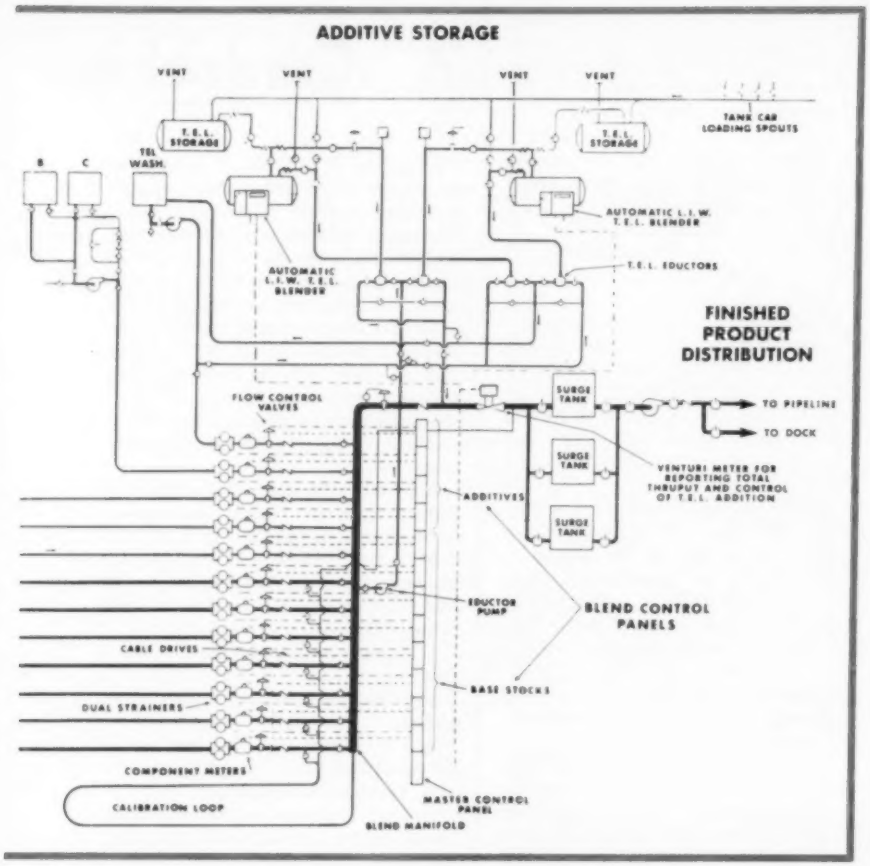
Calibration loops have been in use on other blending installations but Sohio's engineers determined to go one step further. Instead of running a scraper or pig from one end of a carefully measured line to some receiver downstream or running it around a loop, they decided to use gravity as an aid in minimizing valving to get the pig back to the launching barrel ready for its next check. As a result, a very unusual calibration loop is designed in which the last leg of the pig's journey carries it up to a peak from where it drops to its stop in a vertical line. To move it back to the launching point merely requires a few valve changes and gravity drop.

Provision is made for feeding any component stream to the calibration and blend manifolds. A light on each panel indicates if the blend manifold is open, thus enabling the operator to

AUTOMATIC blending system utilizes a partial manifold scheme, with cross-connections to reduce number of panels, provide sparing, and to give flexibility of range. Each suction valve is interlocked with control panel.



CALIBRATION LOOP in the blending system is very unusual. As shown in the right background, this loop is vertical.



line up panels to feed the blend. In addition each panel contains a selector switch to lock in proper supply stream to proper valve circuit.

Additives, apart from TEL which utilizes the conventional loss-in-weight, flow-proportional scheme, are also controlled in the same fashion as base stocks.

The photograph of the blender panel shows, left to right, the master panel, two component panels, lineup panel, (two pumps), spacer (for future addition) single component panel, spacer, single component panel, lineup panel (two pumps), etc.

On the master panel, control and information are provided by control switch (off, on, test, reset totalizers, blend, calibrate), rate adjustment handwheel, gasoline flow recorder and reset and cumulative totalizer, aviation and motor TEL totalizers (reset), pressure indicator-controller (to maintain blend manifold pressure), batch counters, start buttons for batch, calibration, reset and supervisory lights.

Pump lineup panels provide pump selector switches, line-up test, and run lights.

Surge tanks are provided so that in the event of blender failure, product will be available to the pipeline for a period up to 4 hours. This is considered adequate time to get the blender on stream.

6. Models were used as design tools

AT THE OUTSET of the design phase of the new Toledo facilities it was decided that in line with gaining the ultimate in design and yet maintaining the most economical plant, a model should be built and be used to the fullest extent as a design tool.

The program chosen was to first build a rough block model in 1/16 in.=1 ft. scale to develop the general plot layout, using movable cylinders, rectangles, etc., on cross-sectioned paper.

Next, a plant layout model 3/8 in. =1 ft. was built to depict the job at completion of planning work and prior to beginning detailed pipings designs. All major equipment, structures, instrumentation, and piping were shown at this stage. The same model was then used to make the

CAT CRACKER LAYOUT was studied completely, using models, before construction was started.

final version in complete detail by the addition of all piping over 1½ in. as well as starter racks, local control boards, and minor equipment previously omitted.

A model technician was assigned to, and worked adjacent to, a designer for each area in order to maintain concurrent model construction with the design of that area. With this arrangement the designer was able to clearly visualize his design as it progressed. This enabled improvements, changes, and adjustments to be made on specific items without delays and without causing backtracking and revisions to fully completed areas. The model was referred to constantly.

At the completion of the plant-layout stage thorough reviews were made by both Sohio and Kellogg groups. The seven process sections and power plant were constructed on 19 model tables each having an average 3 by 8-ft. floor space. This required an assembled floor area of 26 by 29 ft. Because of the tremendous size of this model (the largest that Kellogg has ever built) it was necessary to carefully schedule by date and hour the review time for each unit. In addition to the M. W. Kellogg design, operating, and construction groups, there were more than 30 Sohio engineers scheduled for reviews from their engineering, operating, safety, and maintenance groups.

These early planning release reviews covered basic layout; runs of major lines; extent of all platforms, ladders, stairways, access, equipment handling, and numerous other plant layout features.

It is interesting to note here that some reviews and approvals were made directly from the layout as shown on the models. The major comments accumulated from the extensive model reviews were then incorporated both into the model and the design drawings before proceeding with the production design work.

Photographs were taken of the model and sent to the Sohio offices and to the construction forces.

Design and model work was then continued through the production stage. At the end of the production design stage thorough reviews were again scheduled and made by both Kellogg and Sohio engineering groups. These reviews covered arrangement, size and flow of all pipe; valve locations; position of valve stems; instrument locations; control valves; instrument and electrical leads; utility hose connections; lighting panels; fire-hydrant locations, and all other detailed items that go into a complete refinery. All changes and comments were then incorporated both into the design drawings and the model.

The model was then shipped from New York to Ohio. The model took 1,600 cu. ft. of shipping space which required a double-tier arrangement in two large moving vans.

A special training building had been prepared at the job site to house the model and to provide office and "classroom" space for the training of operators. The model was used as one of the key tools along with the operators' manual in operator-training work by Sohio and for all phases of erection planning and scheduling by the Kellogg construction force.

A few specific items on how the model was used as a design tool during engineering are as follows:

1. A space and piping cost problem, resulting from a change from water to air cooled heat exchangers, was resolved by locating air coolers above the yard bank. Doubts as to the feasibility of this solution were removed when design was shown on the model.

2. Better use of maintenance derrick resulted after viewing model. Originally, derrick was intended to service a 42-in. valve. Relocation of manholes and platforms on major vessels made it possible to use derrick for 60 additional heavy accessories which must be lowered to grade for maintenance.

3. Complete agreement between client and design representatives was reached, without preliminary drawings, on layout of multiple furnace inlet. What was wanted was a completely balanced arrangement for equal pressure drop. New arrangement was set up on model and agreement reached in one meeting.

4. Complicated blending station, difficult to visualize from design drawings, was readily understood from the model. After viewing arrangement on model, those responsible for process, operation, and maintenance agreed the planned arrangement of valves and instruments offered maximum convenience.

5. Cyclic nature of coking operation requires careful planning for maintenance. Problem was how to obtain best access arrangement. Original plan, viewed on model, was modified several times to obtain an arrangement acceptable to maintenance groups.

6. Designers crosscheck models and drawings to make sure final design incorporates desired features.

7. Control is

THE CONTROL PHILOSOPHY for the integrated refinery utilizes centralized control from a "nerve center." Maximum efficiency of personnel is achieved by a special arrangement of control board, communications system, and operating personnel. From this point the primary operators maintain close control over feeds, products, and all "key process variables." In addition, they can quickly handle all emergency alarms, shutdown controls, and keep in touch with outside operators.

Supplementing the nerve center are eight "satellite" boards to control those operations which are best handled locally. These are strategically located so that the "outside men" will find them most useful in their normal rounds. Included are the following:

1. Crude and vacuum furnace firing.
2. Catalytic reforming regeneration section.
3. Cat reforming, cat hydrogenation, and unsaturate gas-plant section.
4. Delayed-coking section.
5. Cat cracking, unsaturate gas plant, and catalytic polymerization section.

Control Board 96 Ft. Long

In addition, small boards are located in a number of other areas to facilitate startup and routine-check operations. These include boiler-house water-treating plant and cat cracker air blower. Weather protection is provided for the instruments and maintenance personnel only where required.

The nerve center control board is 96 ft. long and arranged in a semicircular form to facilitate communication between nerve center operators and to provide the widest view of the equipment. It presents a panoramic view in graphic form of the process area, complete with the controls for crude, coker, cat cracker, reformer, hydrogenation, and steam-generating sections. All the essential controllers, recorders, alarms, and shutdown systems required for safe and efficient control of the entire plant are located in the graphic layout. Supplementary instrumentation for "trim control" are located on the satellite and local boards.

All control instruments which affect the over-all operation and are not part of the main board are diagrammatically shown on a 2-ft.-high supplementary panel board. This is

lodged in "nerve center" and satellites

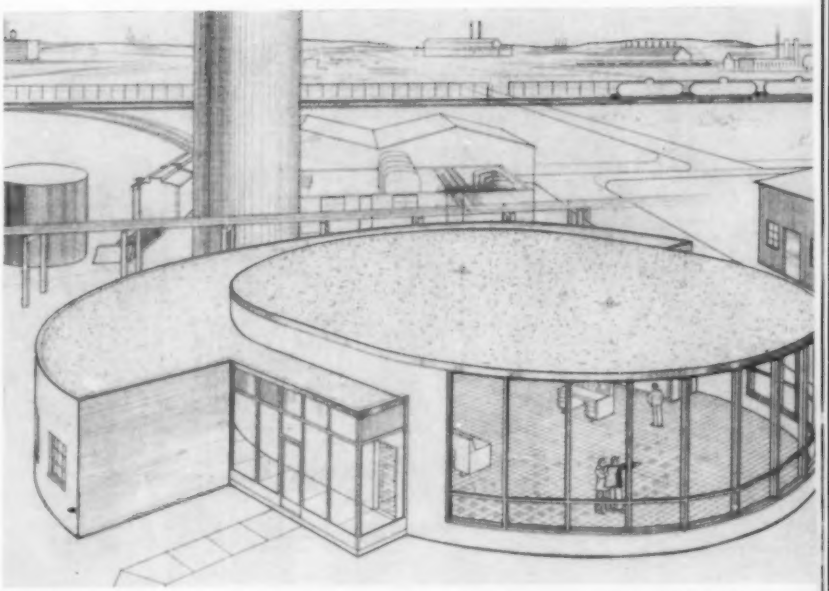
mounted directly above the main graphic panel in the nerve center. Thus the main operator is kept informed of all control available to satellite and local operators.

Not only is the main control board considerably shorter than it would have otherwise been, but it is uncluttered by extraneous and confusing instrumentation. The shorter board can be operated completely from three console-type desks. Indicating and recording instruments for monitoring process temperatures are mounted in these desks for easier observation and logging.

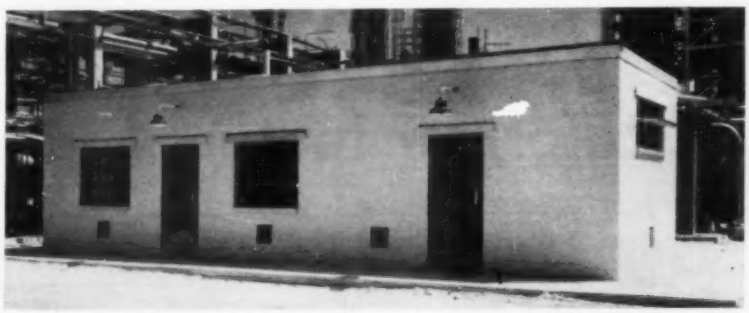
Two-Way Telephone System

To keep all operators informed, a two-way telephone system has been installed in all satellite stations, as well as in the nerve center. Loud speakers and an emergency radio system throughout the plant provide an additional means of communication.

The control house itself was designed to combine the best in utility with unique architectural effect. The semicircular control board at the rear and a semicircular window of heat-absorbing glass at the front form an elliptical control area providing maximum utilization of area, as well as visibility of board and refining areas. The exterior of the building was treated with careful consideration to Sohio's trade name and color scheme, using glazed brick.

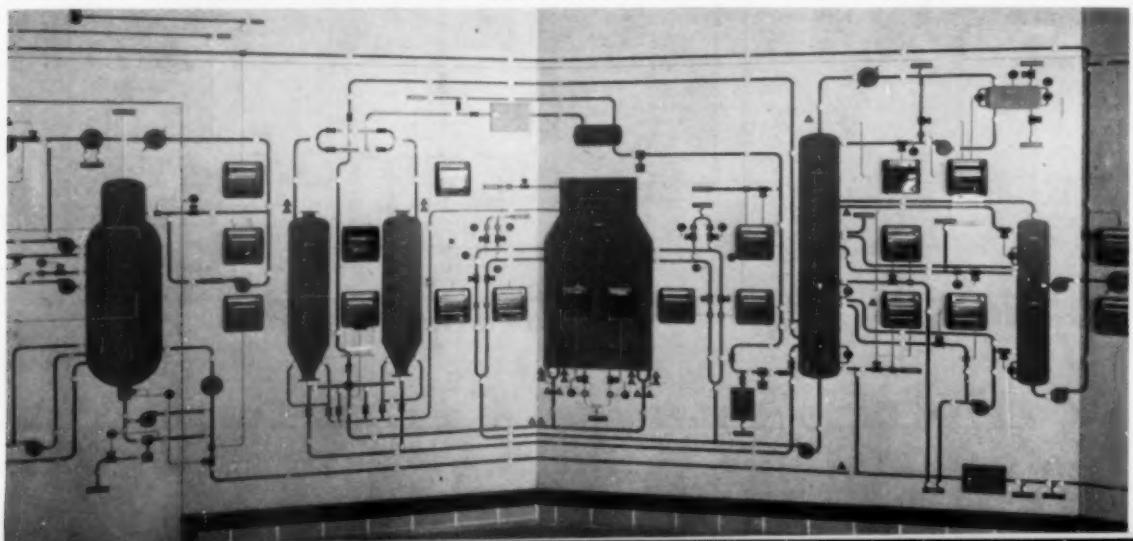


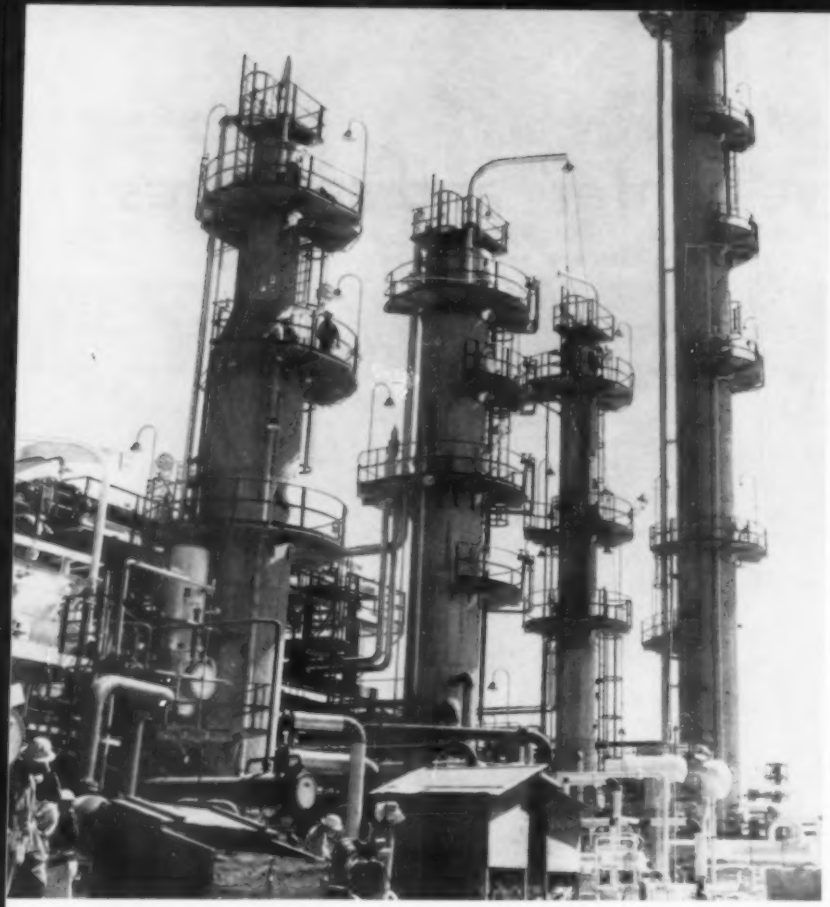
NERVE CENTER for the refinery is this circular control house. It receives signals from . . .



. . . **SATELLITE CONTROL STATIONS** such as this one at the coking unit. Satellite signals are transmitted to the . . .

. . . **COKING PANEL BOARD** in the nerve center. Complete panel board is 96 ft. long and fits circular contour of the building.





SATURATE GAS PLANT ultimately handles a large portion of the offgas from the catalytic reformer. Reformer is located just to the left of this gas-handling equipment.

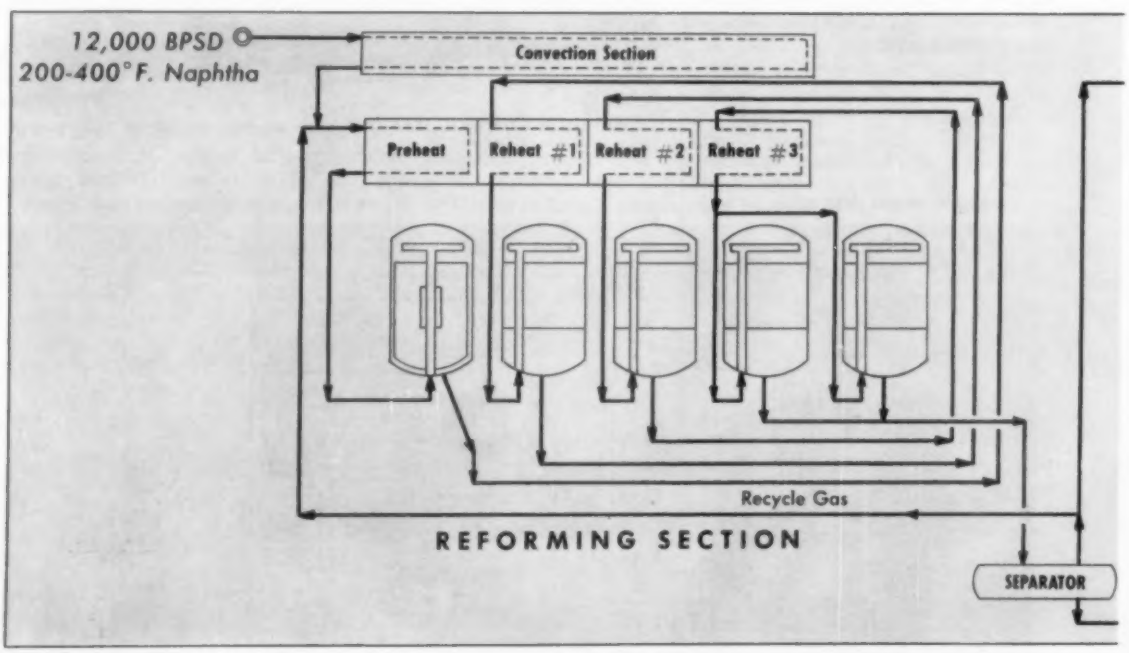
New Toledo Refinery

AN UNUSUAL DEGREE of compactness with an appreciable saving in space, initial cost, and operating expense has been achieved in the platinum reforming section of the new Sohio Toledo refinery. The section is designed to process 12,000 bbl. per stream day of desulfurized and denitrogenated naptha (200°F. i.b.p. to 400°F. maximum f.b.p.) which is sent directly, without storage or intermediate cooling, from the naptha splitter in the saturate gas-recovery system. From this feed the reformer can continuously produce a 100 CFR-R clear octane reformate.

Five reactors . . . The catalyst used is Sinclair-Baker-Kellogg RD-150; the reaction section is comprised of five reactors the first being of the radial-flow type, and the remaining four of the axial flow variety. The reactants pass through the first four reactors in series with another reactor capable of replacing the third or fourth reactor while either is regenerated.

The effluent, after it is used to preheat incoming feed and recycle gas, and to reboil the product recovery section, is sent to a high-pressure separator in which recycle and net make gas are separated from the un-

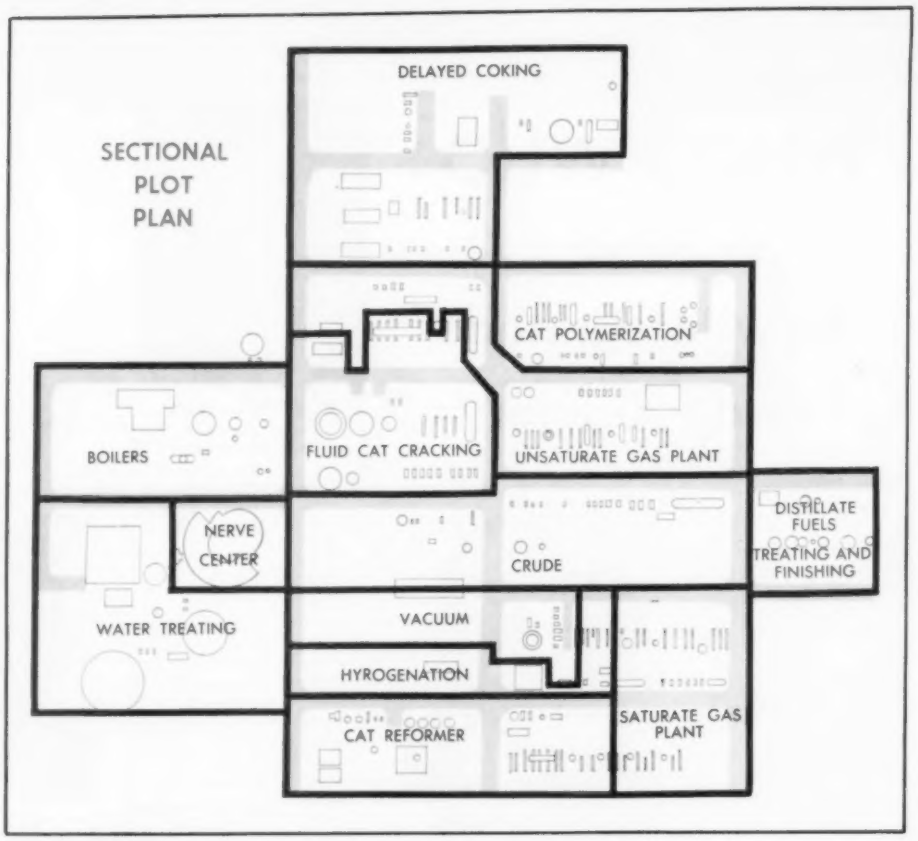
8. Reformer features compact reactor fur



stabilized liquid product. The net make gas provides the source of hydrogen for the catalytic hydrogenation section.

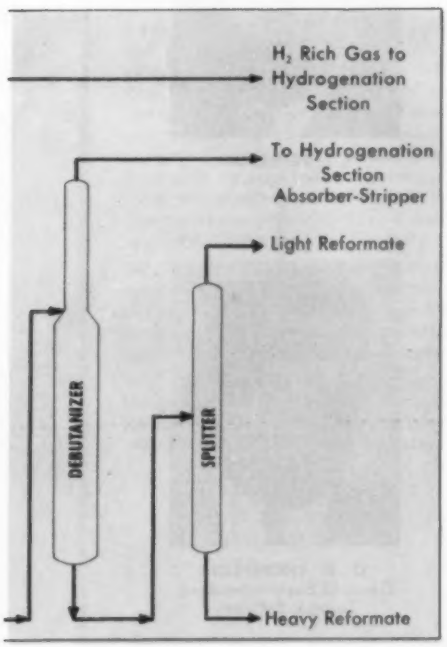
The separator liquid is debutanized; the overhead liquid and gas are sent to saturate gas recovery, and the bottoms liquid is subsequently split into a light and heavy reformate.

Regeneration of any of the last three reactors can be accomplished with the reformer on stream. The necessary flue gas-air mixture is supplied by a self-contained catalyst-regeneration system. A blocked operation, with feed cut out of the unit, is used for the infrequent regeneration of the two lead reactors.



CAT REFORMER fits into over-all plot plan of refinery as shown here. Heat exchangers, pumps, fractionators, and other equipment requiring periodic maintenance were lined up for easy access in all processing areas. The refinery is provided with a fine system of roadways, laid out so that all areas are easily reached with necessary tools and equipment.

nace layout



Reactor-furnace layout . . . The most ingenious mechanical innovation in the reforming section is in the reactor-furnace layout. The row of five reactors and the four-cell combination furnace are parallel and separated by a space of not more than 10 ft. This compact arrangement coupled with several somewhat uncommon features in both the reactors and the furnace made possible a considerable savings in investment.

The reactor inlets and outlets are all located at the bottom of the vessels. This makes it possible to set all intermediate piping on a single, essentially horizontal plane. Less piping is required to carry the feed to the reactors than would be necessary with the inlets at the top. The transfer-line valves are close to grade for easy accessibility.

The reformer heater is a four-cell combination furnace with a cross convection bank common to all the radiant sections. The prime advantages of this type of furnace are high efficiency and extremely low pressure drop. Using a single convection section for the four cells results in an efficiency of about 75%; the inherent low pressure drop conserves compressor and charge pump horsepower, and reduces initial and operating expenses.

Furnace headers . . . These are so mounted that they can move forward or backward as expansion demands vary. The parallel headers in each cell are connected by inverted hairpin tubes on centers varying from 6 to 9 in. These tubes are sufficiently flexible to accommodate any changes in the header positions caused by expansion and contraction.

The lines between the furnace and transport material heated to 980°F. and 400 psig; the unique design of the system eliminates any need for large and expensive expansion bends.

The furnace uses carbon-steel tubes in the convection section and alloy tubes in the shield and radiant sections; fin tubes are employed in the convection section to provide an extra measure of efficiency.

The new reformer provides a significant contribution toward answering the ever-present question of how to supply higher-octane fuels in a manner which is both economical and efficient.

WHO'S WHO in Sohio's New Integrated Toledo Refinery

E. B. McCONNELL
Vice President,
Manufacturing

DR. F. J. SANDERS
Engineering
Manager

W. K. BERGEN
Operations
Manager

H. F. WEST
Chief, General
Engineering Division

E. N. MARSH
Chief, Process
Engineering Division

I. L. PETERSON
Manager,
Toledo Refinery

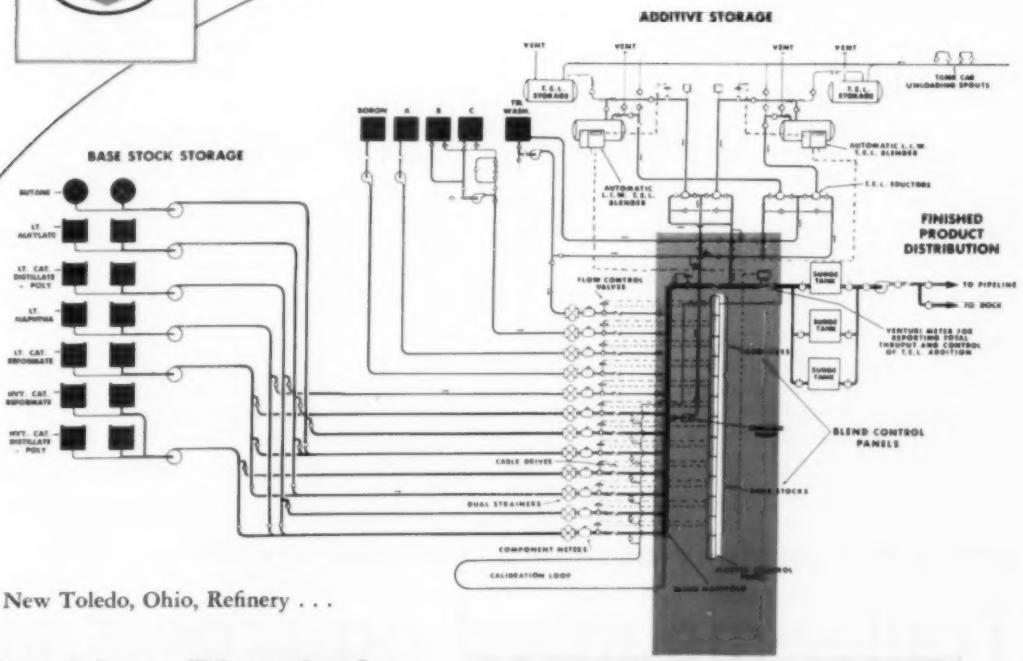
G. R. THOMPSON
General Superintendent,
Toledo Refinery

Sohio's new Toledo refinery will increase the company's existing refinery capacity about 25% and double its capacity of a decade ago. The 60,000-bbl. per day "process unit" will cost $40,000,000 and is scheduled to go on stream next month. These are the men who made the decisions involved in its design and construction and the men who will supervise its operation.

POSITIVE CONTROL OF MATERIALS IN MOTION

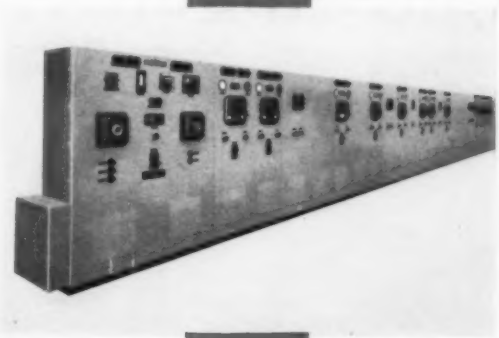
METERS FEEDERS CONTROLS

SOHIO



Sohio's New Toledo, Ohio, Refinery . . .

Fully In-Line Blended, Specification Gasoline *"On the Run"*



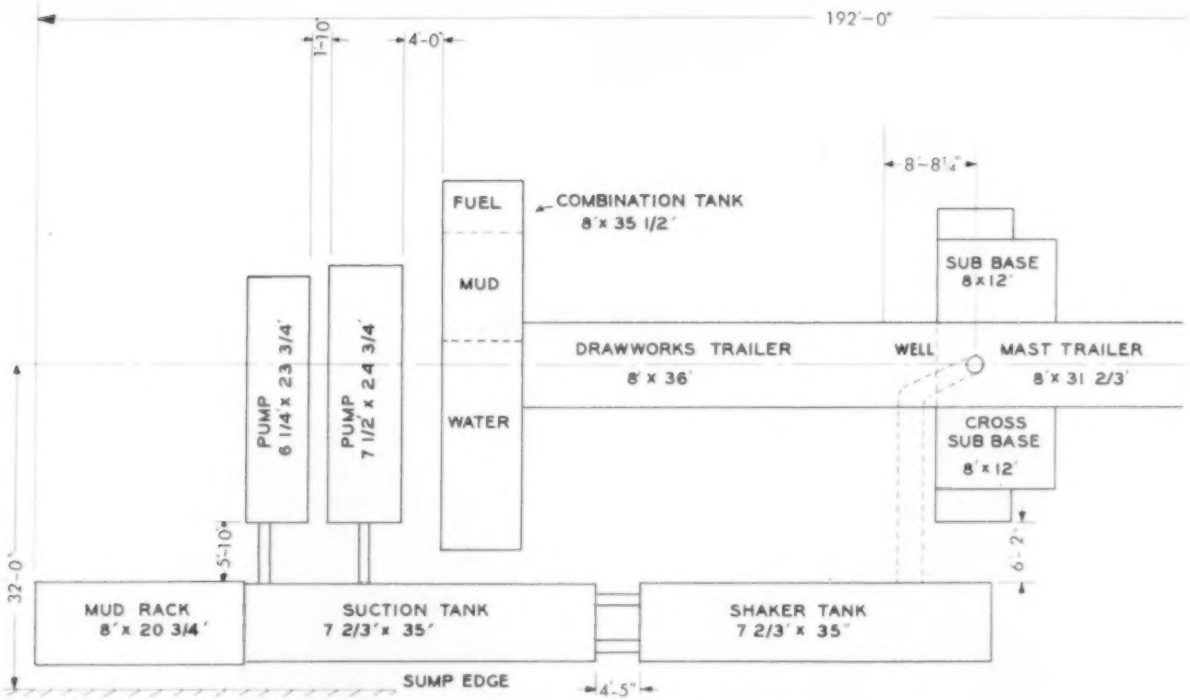
At Sohio's new Toledo, Ohio, Refinery, operators can now send any of the Sohio quality grades of gasoline direct from rundown tankage, through the new Proportioneers Blender, on its way to market. Simply by changing settings of a switchboard control and certain valves, operators turn out a steady stream of any quantity of specified grade gasoline. And then, in a matter of minutes, they can switch from specifications of one grade to those of another. Operators are provided with fingertip control over any formulation in any quantity.

Sohio, in its equipment specifications, very emphatically required "error-free operation from the operator's standpoint." The Proportioneers Blender provides this through electrical valve interlocks, "fail-safe" design, and unique calibration loop features.

Keep tuned to progress by requesting complete data on this system. Write **Proportioneers, Inc., 377 Harris Avenue, Providence 1, Rhode Island.**

PROPORTIONEERS
DIVISION OF
B-I-F INDUSTRIES

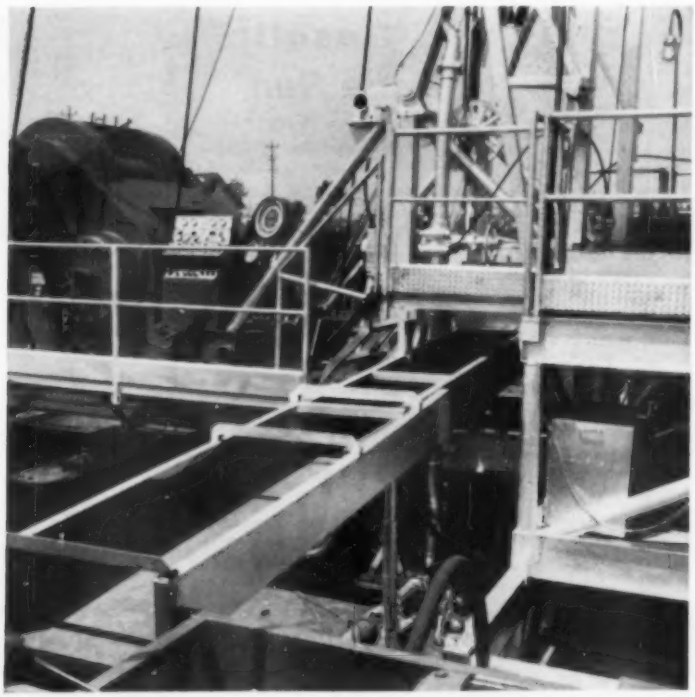
METERS FEEDERS CONTROLS



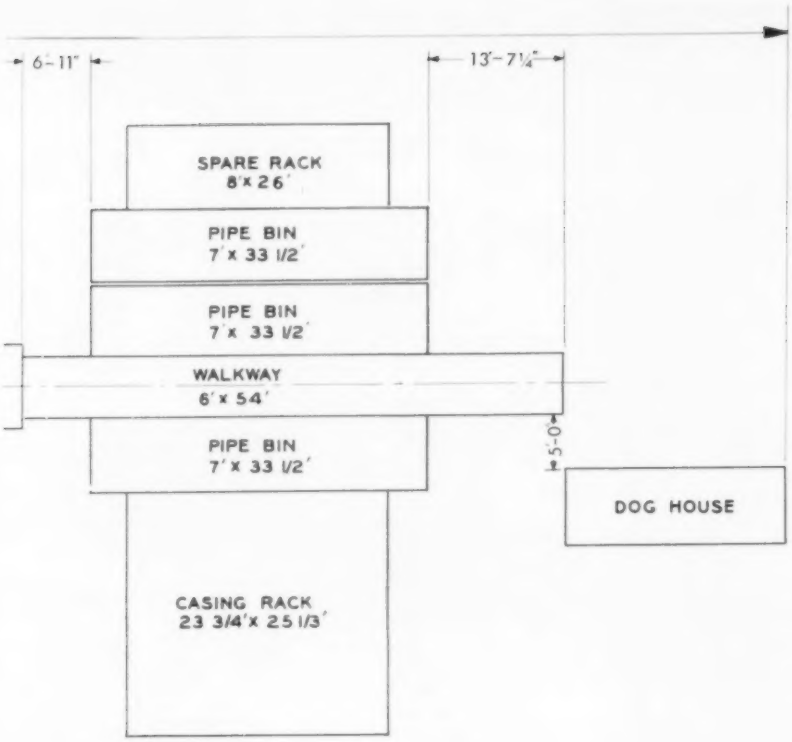
Using this carefully designed, compact layout . . .

Trailer-mounted rig scoots on, off

THIS GUYLESS MAST, 126 ft. high, is mounted on a 32-ft. trailer and uses the large combination tank as an anchor. Fig. 1.



DRILLER'S CONSOLE is mounted on draw-works base, about 3 ft. below level of the derrick floor. The open mud-return ditch telescopes about midway, making for rapid installation and removal. Fig. 2.



drilling site quickly

D. H. STORMONT
District Editor

NOW AT WORK in the gas fields of Sacramento Valley, Brown Drilling Co.'s newest drilling rig is designed to meet the low contract prices which have prevailed in California fields in recent years.

Trailer mounted, the rig requires little time getting on and off locations. Only one connection is required in the rotary drive after the mast and draw-works trailers are spotted.

Fast drilling is provided in the 1,500 hp. available, well-balanced between the pumps and hoist. Classed as a medium-depth rig, it will specialize in drilling to depths of 4,000 to 9,000 ft.

Highly unitized, minimum effort is required for rigging up and tearing out. Mud, water, and fuel lines and power cables are unitized into various equipment packages wherever possible. Packaging is so designed that the entire rig can be quickly moved in 13 loads, including 8,000 ft. of 4-in. drill tubing.

For highway moves the rig breaks down into the following loads:

Load 1—Mast trailer, 65,000-70,000 lb., requires permit.

Load 2—Draw-works trailer, 78,000 lb.

Load 3—Combination mud-water-fuel tank, trailer mounted.

Loads 4, 5—Mud tanks, including hand rails, mud rack, and miscellaneous mud equipment.

Load 6—Main pump skid, about 40,000 lb.

Load 7—Auxiliary pump skid, approximately 30,000 lb.

Load 8—Substructure and prefabricated mat.

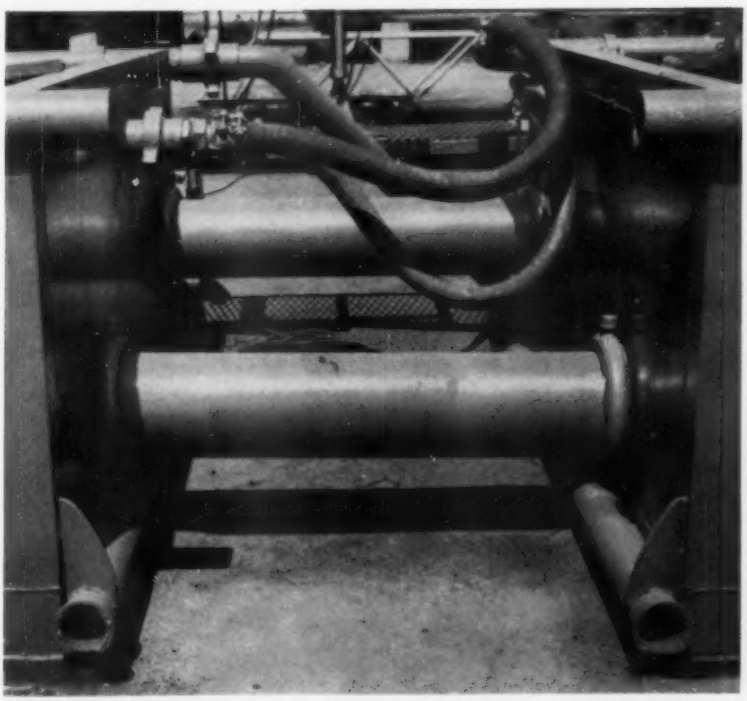
Loads 9, 10, 11—Pipe bents.

Load 12—Drill-collar rack.

Load 13—Dog house and blowout-prevention equipment.

The unitized and prefabricated surface mats permit quick leveling and easy alignment of the mast trailer with the draw-works trailer. Guides and stops bolted to the wooden mats make exact spotting of the trailers a relatively easy process. With these in place, other equipment loads can be correctly located as they arrive at the new location.

Because of the extent to which all



MUD TANK CONNECTIONS are designed for fast makeup and breakout. Hammer-type fittings on the flexible hose join the mud lines, which are unitized into the two 35 by 8-ft. tanks. Pipe extends into both tanks. Fig. 3.

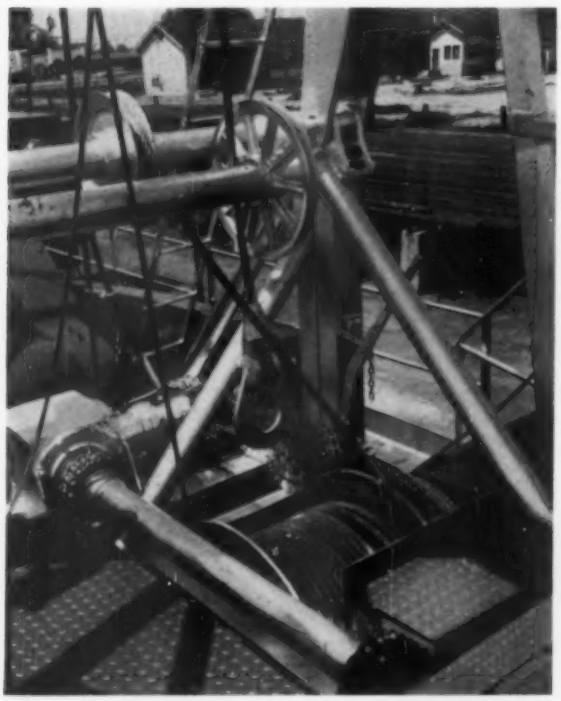
mud, water, fuel, air, and electric lines are unitized into the equipment packages, two men equipped with hammers can make all connections within 45 minutes. Wide use of rubber hose as jumpers between various packages allows some leeway in positioning of packages.

The Bender mast has a safety factor during raising in excess of 3.5 and has a hook load capacity of 320,000 lb. Design of the crown block and sheaves gives a near-equal loading on all four legs. A minimum yield point of 50,000 psi. was attained in the lower legs of the mast through use of high-strength "Cor-Ten" steel.

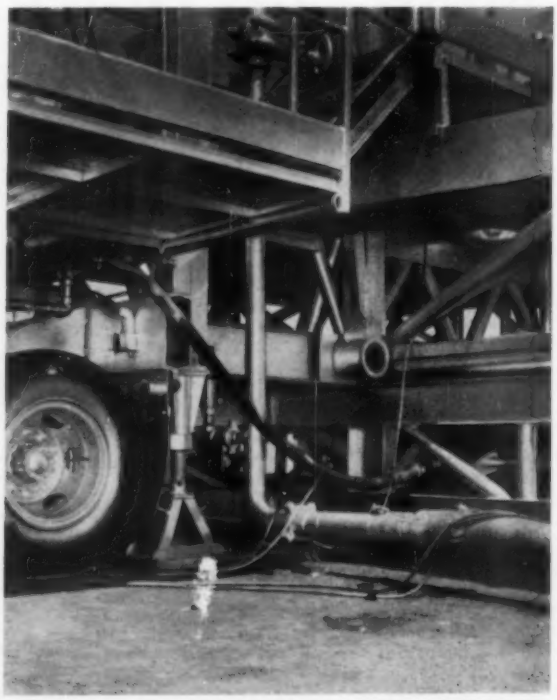
Other than that mounted on the trailers, all equipment is placed at ground level. This minimizes the need for cranes during rigup and tear out. Further savings are realized through the small number of packages which must be handled. Still another step taken toward cutting crane costs is the use of aluminum for stairways and hand rails. Two men can easily carry the stairs and put them in place. The rails can be handled by one man.

Drill tubing used is 4-in., 11-lb., external upset. The tool joints are 4-in. API regular-bored to 3-in. i.d. and 5¼-in. o.d. They are stored in the three combination bins and racks adjoining the pipe walkway.

WALKWAYS for the draw-works trailer are formed by crossbraced sheet metal sections riding on pipe supports. Rollers beneath the pipe braces permit the walkways to be easily pushed back under the trailer floor for moves. Fuel, water, air, and electrical lines are unitized into the trailer base so that this phase of rigging up consists largely of plugging in power lines and making up connections on the other lines. Fig. 4.



HEART of the mast trailer is this dead-line storage drum. By connecting the chain to the rotary-drive takeoff, line can be spooled from the draw-works drum onto the spare drum. The 30-in.-long shaft in the foreground is the only connection which must be broken when mast and draw-works trailers are moved. Fig. 5.



THE TWO TRAILERS MEET just above the draw-works wheel. Bases of the two trailers are held together by pin-and-eye connections. Screw jacks assist in leveling the trailers, and remove the load from the wheels. Note how heavy-duty rubber hose are used to interconnect cooling water and mud lines. Fig. 6.

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Fig. 1

This unusual double-wall liner
controls sand and gives drillers a . . .

New tool for fighting pipe collapse

BY B. P. BAYLISS
Petroleum Engineer, Los Angeles

LIMITED EXPERIENCE with a new-type double-wall liner for oil and gas wells—one which represents the first basically new concept offered in liners in many years—indicates operators may have a significant new tool for combating pipe collapse and controlling sand.

The new liner was first installed in a coastal California well more than a year ago. Its excellent performance in an area where collapse had caused many costly redrill jobs soon led to its use in five other wells. In these, as in the first well, it likewise aided sand control. There has been no evidence of failure of these double-wall liners to date.

An oil well liner may be defined as a short string of casing perforated all along or at intervals along its length. The perforation may be done either before or after it is hung in the well. It is lowered into a well on drill pipe, tubing, or drilling tools to a position opposite the expected producing interval of the well.

It is run inside the smallest-diameter full-length string of casing, usually known as the oil string. This short liner string is generally suspended in tension from the lower portion of the oil string by means of slips contained in the liner hanger.

Function of a liner is to properly allow gas and fluid from the formation to enter the well bore, and to be produced up the hole to the surface. To do this it should:

1. Be strong enough to prevent collapse under all conditions to which it may be subjected.
2. Allow fluids to enter without undue restriction.
3. Prevent the entrance of solids, including sand and all other clogging and plugging materials.
4. Contain adequate nonplugging perforations.
5. Resist the erosional or cutting action of the entering fluids and gases.
6. Resist corrosion.
7. Possess enough tensile strength to hang without parting and withstand formation shifts and adjustments.

Types of liners . . . There are many types of liners. A liner is known as solid or blank if it is run into the hole without first having been perforated. A preperforated liner is simply known as a perforated or shop-

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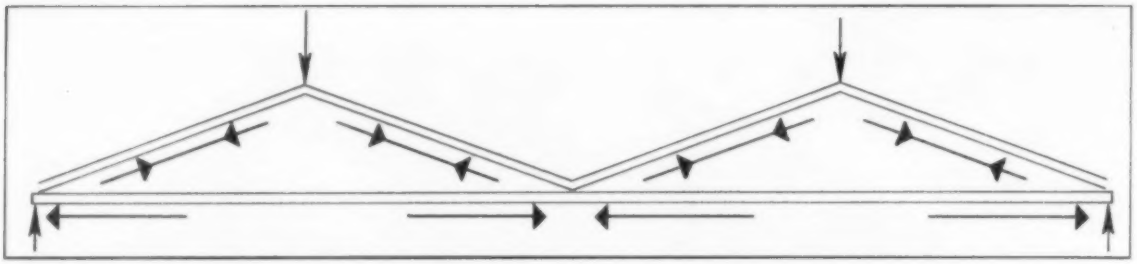


THE DOUBLE-WALL LINER uses 8-in.-long bowls put together in a builtup tubular structure having a cross-section resembling a sawtooth or cantilever-type truss. Fig. 2.

perforated liner. A combination liner has part of its length perforated and part blank.

Usually blank or perforated liners are cemented in the hole with the cement returning up the annulus to the top of the liner, sealing the lap between the casing and liner. Liners may be circulating or noncirculating types. They may be suspended by plain liner hangers or by those having lead seals.

Under the heading of special-use liners would come the so-called sand-exclusion type. One of these is the wire-wrap liner. After perforating the basic liner stock, wire having a square cross-section (stainless steel or galvanized) is wrapped tightly around it.

The wire is held from actual contact with the tube by longitudinal lugs spaced about every 20° around its circumference. The wire itself is lugged every ½ in. to provide very accurate spacers between wraps for the desired inlet width. This type liner is quite expensive.

The prepacked gravel liner is another of the sand-exclusive type. It consists of a special tubular sleeve of inner and outer screens, with gravel of proper uniform size packed between the screens. The sleeve is slipped over the perforated pipe and held in place by welded steel end rings. When troublesome running sands are encountered, the uniform-size gravel filters the oil. The perforations or the inside of the bore, are not plugged with flour sand.

Combating collapse . . . An attempt on the operator's part to prevent liner collapse failures has resulted in the use of so-called heavy wall liners. These have appeared in the last few years with wall thickness ranging from ⅛ to a full 1-in.; that is, a 5-in. o.d. liner would have a 3-in. i.d. These are made for the most part from seamless alloy steel tubing, and have been combined with wire-wrap to give both high strength and sand-exclusion properties. These liners may run up to $30 or more per linear foot in cost.

The collapse failures which have had so much time and effort spent in seeking their solution, constitute one of the most costly problems of the oil industry. One deep field in southern California has been plagued with these failures for the past 12 to 15 years.

No solution has yet been found. It has been called the $64-million-dollar question—how to prevent collapse or liner failure. Many wells in this field have had multiple redrills due to liner failures, two or three times since the original completion.

The cause of a specific liner failure is often difficult to pin down. Rarely is any portion of the liner recovered. Impression blocks are about the only tool with which to attempt to "see" what shape the top of a sheared liner has at depths of 11,000 or 12,000 ft.

Sometimes the scratches or nicks on the sides of a bit or drill collar, or some slivers of metal recovered, will give a hint of what has happened. But by then management is understandably not interested in spending any more money in trying to find out what happened. It's too late to do anything about it, anyway. So an expensive redrill is in order.

THE AUTHOR

B. P. Bayliss was with Shell Oil Co. in the Mid-Continent for 3 years immediately following his graduation from Ohio State University as a mechanical engineer. As a junior petroleum engineer, principally in the drilling department, he worked in fields in Oklahoma, Kansas, and the Texas Panhandle. Following 5 years in the U. S. Army during World War II, he joined a Long Beach, Calif., firm as a design engineer for portable drilling, servicing, and production equipment. For the last 7 years he has been a petroleum engineer for an independent drilling and producing company in Los Angeles.

Why collapse occurs . . . Most oil men concerned with liner failures would probably agree that the greatest single cause of failure is erosion, with subsequent sanding or plugging troubles and eventual liner collapse.

The erosional or cutting action of the oil and water from the producing zone varies greatly with the velocity of the fluid. This is considered to be quite an important factor. It may not have been given the attention it deserves in relation to the erosional action of perforations in a liner.

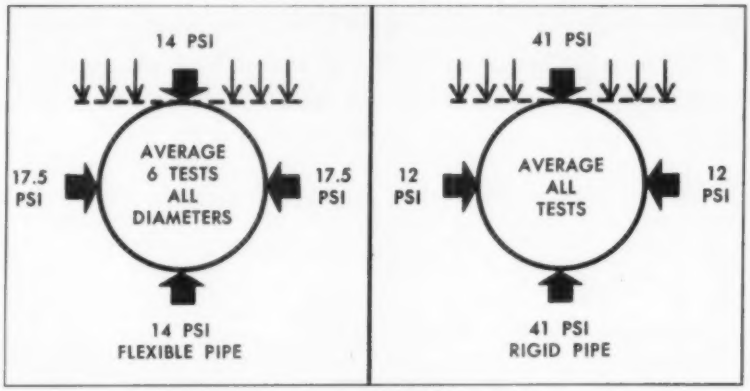
Some authorities have stated that the carrying power of water is roughly proportional to the sixth power of the velocity. If this be true, doubling the velocity would increase the carrying power, and hence the erosional action, by 2 to the sixth power, or 64 times. If tripled, the cutting power would be increased about 729 times by this rule. The hydraulic miner uses this basic principle to earn his living.

What about the rate of velocity of fluid entry through the individual perforations of an oil-well liner? Assume there is a liner 500 ft. long in a well producing 500 bbl. of fluid daily. Further assume the liner is perforated with 10 rows of 2-in. slots on 6-in. centers, 60 gage.

Now 500 bbl. per day calculates to be 3,350 cu. in. per minute. Such an authority as the Los Angeles Metropolitan Water Department states there are 20,000 drops per quart, or 345 drops of water per cu. in., plus or minus 1%. Giving oil the same number, an average entry rate of 115 drops per minute—less than 2 per second—needs to come through each 2-in.-long slot in the liner.

Only a portion of the interval in this hypothetical well is net oil sand, however, and its widely varying permeabilities, porosities, and saturations mean that the oil is not flowing in evenly along the full length of the liner. It may be that only 5% of the perforations are admitting the bulk of the fluid.

This would cause a volume increase in the order of 20 times for the entry opposite the prolific zones. Even



A TEST of corrugated-steel culvert pipe, compared with straight-walled pipe, shows the advantage of the "bowl shaped" pipe liners. In flexible corrugated pipe at left, pressure of earth actually strengthens pipe. In straight-wall pipe at right, load from above is transmitted through pipe, like a post, and most of weight is carried on crown of the pipe. Fig. 3.

so, in a 500-bbl. well, the volume through each slot would increase to only about 40 drops per second, or about a pint every 4 minutes. The slot has an area of 0.12 sq. in. so the velocity would be about 4½ ft. per minute.

This is not fast. It wouldn't abrade any steel. But if this process were continued until only 1% of the perforations accepted 100% of the fluid, the average velocity would approach 300 in. or 25 ft. per minute. At this rate it would undoubtedly have sand-carrying capacity, and probably cutting action also. Increasing velocity of the fluid just 2 times increases carrying capacity in the order of 15,000 times.

For cutting action to occur, therefore, the formation must jet in its production in a highly concentrated stream or an overwhelming percentage of the openings must be plugged or bridged. The latter would force the few remaining perforations to accept the total fluid entry, with a consequent velocity high enough to cause erosion.

TROUBLESOME WELL was redrilled by Douglas Oil Co., the second time with the use of the Fether liner. Outer perforations on the liner consisted of 12 rows of 180-gage slots, each 2 in. long on 8-in. centers. Since installation, the well has produced without trouble (Fig. 4).

New-type liner . . . The double-wall liner was conceived by Don Fether, Fether Manufacturing Co., about 4½ years ago. It consists of an inner straight-wall tube, conventional in all aspects, a length of 5½-in., 17-lb. standard J-55 casing for example. It is perforated to the desired pattern.

Over this length of pipe are slipped short lengths of forged bowls, or double-tapered outer shapes. These are slipped onto the length of straight pipe one at a time and welded into place. Each circumferential weld fuses two bowls and the straight pipe into one solid joint.

The bowls are forged from approximately 9½-in. lengths of straight-wall pipe. They end up 8 in. long, in the shape shown in Fig. 1. They uniformly vary in thickness in such a way as to provide the same cross-sectional area along their full length. A manually applied submerged-arc-welding technique is used at each minor diameter.

The result is a builtup tubular structure having a cross-section that somewhat resembles a sawtooth or cantilever-type truss. (See Fig. 2). A detailed stress analysis has not yet been completed on the design.

The effect of certain types of loading are indicated, however.

As is seen in the sketch, external collapse forces are transformed to tension and compression loads running lengthwise along the tubular members. The inner members are in tension, the sloping sides acting as compression struts. Bending of the tube as a whole would be resisted in much the same way, with the opposite sides of the liner having reverse stresses.

If the pipe is to collapse, the inner tube must be forced out of round. One function of the outer shape is to provide bulkheads to prevent ovalization of the straight tube.

H. C. Texter[1] explains, "Theoretical calculations can show that a perfectly round thin-wall tube, if deformed 1% out of round, will have its resistance to collapse lowered in the nature of 25%." The action of the longitudinal corrugations of the outer shapes should exhibit a high

degree of resistance to ovalization of the inner tube.

Some idea of why liners collapse under loading is offered by tests carried out by the American Railway Engineering Association. It was attempting to evaluate the load-carrying ability of corrugated-steel culvert pipe as compared with straight-walled pipe. The tests were made under 35 ft. of fill, under tracks of the Illinois Central Railroad.

What happened to the two types of pipe is diagramed in Fig. 3. With the flexible pipe, the load caused controlled deflection; the entire perimeter of the pipe moved into and compacted the trench well. With rigid pipe, the tests showed, the load from above was transmitted through the pipe to the bed. All, or most of the weight was carried on the crown of the pipe; it was not distributed around the total perimeter.

Erosion control . . . Erosion-control characteristics of this liner appear to be excellent. The perforations are cut before the bowls are assembled. Larger perforations may be used in the inner liner to assure through travel of particles that enter the openings in the outer shape.

In all applications to date the tapered bowls have been slotted only on the uphole slope. This tends to eliminate the plugging action that occurs when running in the hole. Since the perforations do not touch the inside of the casing or the sides of the open hole, they should remain open during the running of the liner.

This taper also prevents the outside perforations from pressing against the side wall of the hole and possibly plugging the perforations off on that portion of the circumference.

In connection with the erosion-control feature of the liner, it seems reasonable that the two-step feature of the fluid entering the bore hole should decrease any possible cutting action. As fluid moves radially towards the hole it enters first the outer shape. In the annulus the pressure is somewhat lowered, then in passing through the inner perforations the pressure is further decreased.

The liner construction lends itself to flexibility of operation. For example, consider the different size and type perforation combinations that are possible in the two wall thicknesses. Maybe slots in the outer shape and round holes inside would be the optimum combination in some cases. Whether to place the slots in line or offset them is a question for consideration. Why not slot the bottom slope of the outer shape to allow gravity to help keep the slots clean and free of plugging material? How about filling the annular area with sorted gravel to make a prepacked liner out of it? The various combinations are intriguing.

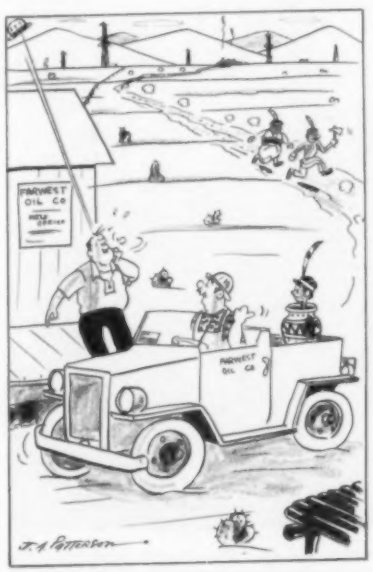
"Why not slot the bottom slope of the outer shape to allow gravity to help keep the slots clean and free of plugging material? How about filling the annular area with sorted gravel to make a prepacked liner out of it?"

First installations . . . There are seven liners in the ground at present, all located in the low-gravity Cat Canyon field near Santa Maria. Production is from the Sisquoc at about 3,600 ft.

Difficulty is experienced in keeping perforations from eroding, liners from filling and pump valves and seats from cutting out. Liner collapse has resulted in a number of cases from overhanging ledges of shale crushing the liner after the supporting sand had been removed by production.

First installation was in a Douglas Oil Co. well originally completed in February 1956. It became troublesome and was redrilled in March 1957, at which time the Fether liner was installed. Since then it has produced without any cleanout jobs or other remedial action to the present. At one time it was shut in for 2 or 3 days for lack of oil-storage space. When the pump was again started, production resumed as though it had not been interrupted. A thinning agent, KD, is injected just above the pump through hollow sucker rods.

The production rate has not gone up markedly from the previous rate but the well was tubed high and its output restricted by pumping slow. Sand cut has been reduced substantially; the operator is quite satisfied with the steady performance of the well.



"I bought it in that little Indian village a few miles back."

Screen analysis made of sand samples taken in the pay zone at intervals between 3,485-3,745 ft. show the extreme flour-like nature of the sand. For most samples, about 65% of the sand was smaller than 100 mesh (Tyler) and about 80% passed the 200-mesh screen.

Produced sand accompanying the oil is about 4% of the well's output. An analysis made of this sand showed 58% of 100-mesh and 86% of 200-mesh sand.

The outer liner used was made from 7-in., 23-lb., J-55 pipe; 5½-in., 20-lb., J-55 was used for the inner tube. The resulting dimensions were 7⅜-in. maximum o.d., 6¼-in. diameter at the weld bead and 4.78-in. i.d. Total weight per foot was 27 plus 20, or 47 lb. per foot.

Outer perforations consisted of 12 rows of 180-gage slots, 2 in. long on 8-in. centers. These were on the upper face of the outer shape (See Fig. 4). Perforations on the 5½-in. were 12 rows of 200-gage slots, 2 in. long on 4-in. centers. The couplings were threaded with API 8-round thread, slightly longer than standard LT&C.

Length of liner run was approximately 280 ft. in a hole of 3,800 ft. total depth. Restricted production from the well has been running about 60 bbl. per day, including 10% injected diluent. Gravity of the crude is about 10° to 11° API.

The same type liner was run in three other Douglas wells, and two other companies have used the liner in the same area. All apparently have given favorable results.

In all jobs, so far, the liners have hung from 8⅝-in. casing set on the top of the pay. The near future may see Fether pipe run in a combination string, using a special adapter between the 7-in. casing above and the 7⅜-in. o.d. double-wall liner below.

References

1. The Oil and Gas Journal, July 4, 1955, page 86; August 1, 1955, page 84; and August 29, 1955, page 85.
2. "New Double-Wall Liner Combats Collapse," D. H. Stormont, The Oil and Gas Journal, Dec. 9, 1957, page 96..

The photograph above shows a Johnston Hydraulic Pumping Unit on a South Penn Natural Gas Company well near Walton, West Va. in the Rock Creek field.

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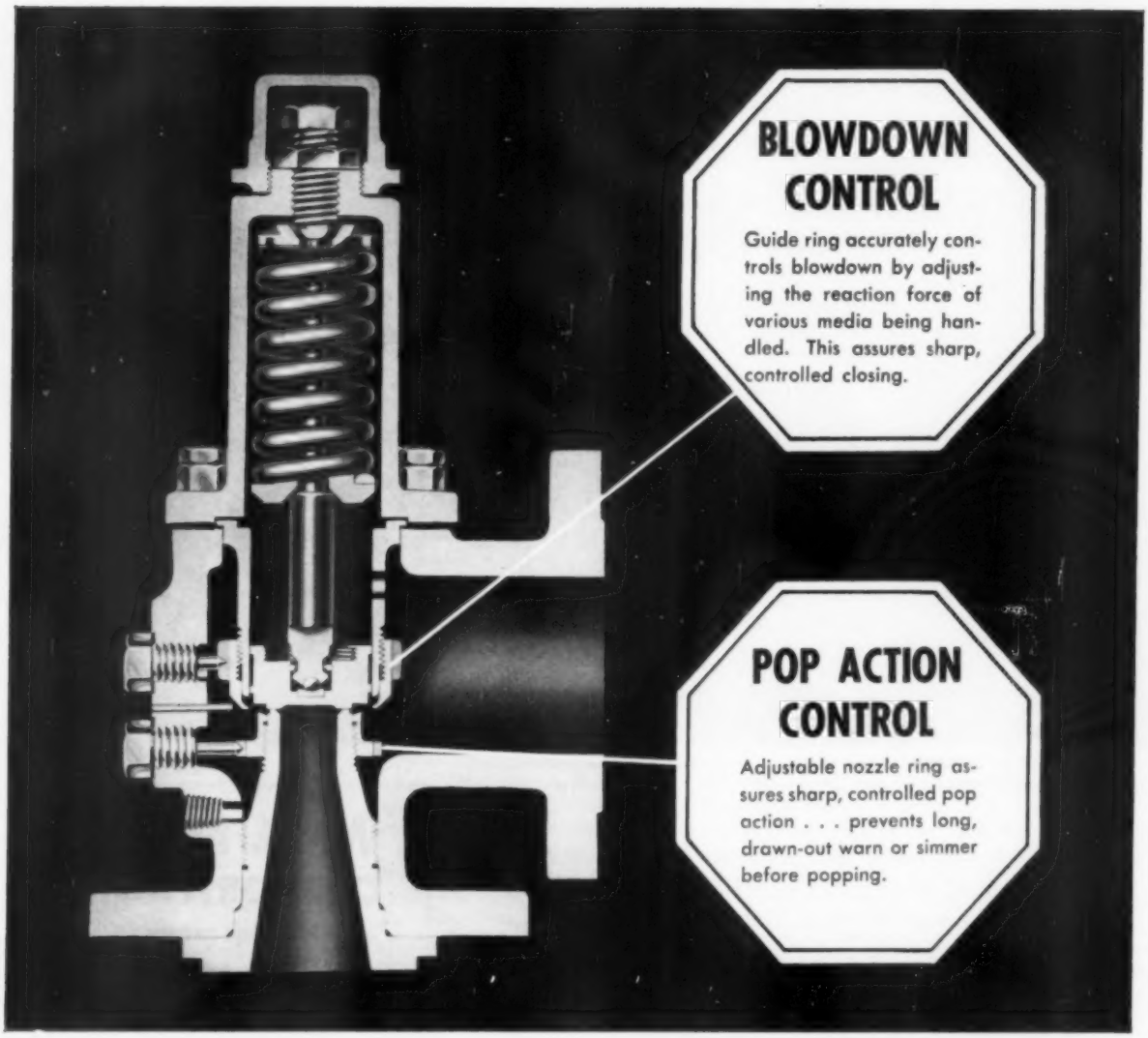
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REFINING

Blowdown systems at La Gloria

One uses water injection, the other uses steam

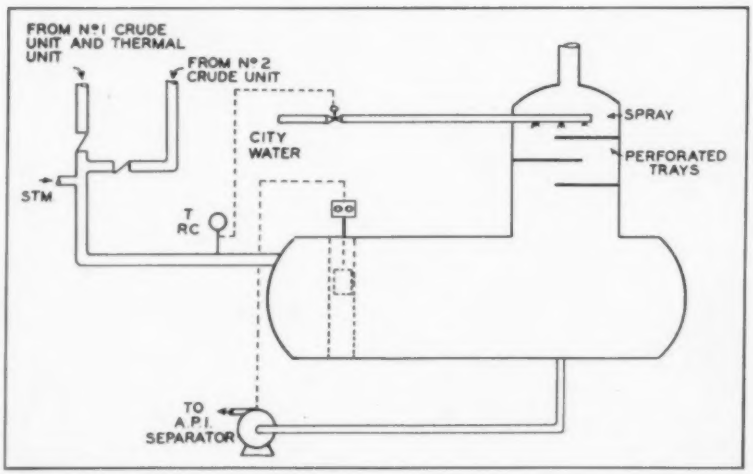
BY LARRY RESEN
District Editor

WATER INJECTION controlled by temperature of incoming liquids is used to retain condensable hydrocarbons on one liquid blowdown system at La Gloria Oil & Gas Co.'s Tyler, Tex., refinery.

In a second blowdown system, steam is used to contain the hydrocarbons, and an oil skimmer in the blowdown drum used for their recovery. In this second application, the blowdown serves an especially important function for use in purging out coke drums on a coking unit.

La Gloria uses the former blowdown installation to handle liquids from two crude units and a thermal cracking unit. In the piping arrangement, one blowdown line handles liquids from the thermal unit and No. 1 crude unit, the other from No. 2 crude unit. These two lines joint at a tee and feed into a common blowdown line running to the blowdown drum. Check valves are installed in appropriate positions upstream of the tee to permit isolation of units during shutdowns.

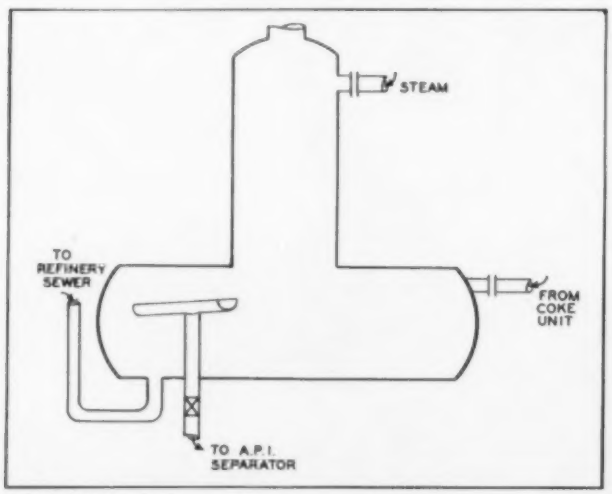
An exhaust steam line injects steam into the main blowdown line on a continuous basis. In this manner, the line is maintained at an elevated temperature, thereby eliminating temperature shock due to sudden inputs of hot liquids. The liquids themselves are charged into a central horizontal blowdown drum, from where they are withdrawn into an API separator.



MAIN BLOWDOWN system has TRC controlling input of city water into tower.

A liquid-level controller is used to operate the blowdown drum pump. The float for this control is contained within a slotted pipe inserted in the drum, in order to maintain stability. The slots extend around only half the circumference of the pipe. The half facing the inlet line has been left solid. This prevents incoming liquid slugs from impinging against the float and causing erratic action.

As the blowdown stream passes a thermocouple well, temperatures are transmitted to a temperature recorder-controller. This operates a motor valve on a high-pressure city water line. When the temperature rises to 280° F., the motor valve opens and water is charged to the blowdown tower atop the blowdown drum. This



BLOWDOWN DRUM on coke unit uses skimmer for removing oil. Liquid-level controller operates pump.

WATER IS INJECTED in tower to spray down condensables.

water enters via a spray nozzle and sprays down across three perforated side-to-side pans within the tower. Hot oil droplets are scrubbed out of the vapors rising through the tower to be returned to the drum. In addition condensation of hydrocarbon vapors is also effected. These condensables and other liquids are all returned to the blowdown drum to be recovered in the API separator.

Coke blowdown . . . The blowdown system on the coke unit additionally serves a direct part in routine operations. It is connected to the unit to handle both liquid and gas blowdown. As part of the unit operations, the coke cases are alternately offstream every 24 hours for cleanout. The procedure followed is to first steam out the case into the fractionator to remove most of the hydrocarbons. The case outlet is then switched into the blowdown drum. Water is then injected into the base of the case for final cleanout prior to removal of coke. The coke case is filled until water flows over the top.

In this setup, the blowdown drum handles an exceptionally high proportion of water as compared to hydrocarbon liquids. Water is withdrawn from the bottom of the drum to go directly into the refinery sewer system. The elevation of the drum is suitable to use gravity flow. Hence, instead of a pump, a simple U-seal is used with contents of the drum held at a constant levl, by the position of the real tube. Installed within the drum is a skimmer fashioned from a half-round section of pipe. The level of the drum is held so that oil is removed from the top of the water and this oil is directed to the API separation plant. The skimmer is located near one end of the drum, most distant from the inlet line to minimize disturbances due to incoming flow. Steam is injected into the tower above the drum.

With these arrangements on the coke blowdown system it is possible to use it not only for recovering liquids as a standard blowdown technique but also to have it function as an integral part of the unit operating scheme. Additionally, the use of the skimmer permits liquid hydrocarbons to be recovered without overloading the API separator with the large amount of flushing water used in cleaning out the cases.

Acknowledgment

Cooperation of the management of La Gloria Oil & Gas Co., a subsidiary of Texas Eastern Transmission Corp., is gratefully acknowledged as is the assistance of Bruce Jones and Dudley W. Caswell, of the Tyler refinery.

MAGNOLIA'S new lube-oil plant (foreground) will blend and package 120 products as . . .

Beaumont refinery expands

MAGNOLIA Petroleum Co. recently put on stream the first of a half-dozen major process units it will complete this year in a huge product-improvement expansion at its Beaumont refinery.

The facility just placed in operation is one of the industry's most modern lube-oil blending and packaging plants. Going into operation later this month at the refinery will be:

. . . A new 8,000-bbl. alkylation unit, the second at the refinery.

. . . A new treating plant to recover hydrogen sulfide from liquid and gas feed stocks charged to the alky unit. This one already has entered the start-up phase.

. . . An LPG fractionation system which will increase the refinery's LPG processing capacity by about 6,500 bbl. daily or about 20%. The unit includes a 194-ft., 200-ton deisobutanizer tower.

Scheduled for completion in September are:

. . . A huge crude still which will charge up to 100,000 bbl. of oil daily and occupy an area almost as large as a city block. The unit will distill crude into unfinished butanes, gasolines, naphtha, kerosine, gas oils, lubricants, and residuum. And eventually it will replace seven smaller crude units at the refinery.

. . . World's largest Sovafiner, a 30,000-bbl. daily unit which will use reformer-produced hydrogen for treating premium heating oils.

Foster Wheeler Corp. of New York is contractor for the Sovafiner, the hydrogen sulfide recovery system, and the new crude distillation unit. Fluor Corp. is handling construction of the LPG system. C. F. Braun & Co. is contractor on the alkylation unit.

The lube plant . . . Magnolia served as its own general contractor for the lube plant.

The plant will blend and package 120 lube-oil products in cans and drums. The blending equipment will handle up to 500 gal. of oil per minute, simultaneously controlling the mixture of three mineral oil components and six additives.

Packaging equipment at the plant is capable of filling, sealing, and packaging up to 500 1-qt. cans of motor oil per minute—more than 8 cans per second. The canning operation is automatic except for loading and unloading operations at rail sidings.

The big 348,000-sq.-ft. plant—its roof covers 3 acres—is served by nine railroad spurs. It has loading space for 16 boxcars and 10 vans. Storage tanks connected to the plant are remotely controlled.

ROPE TRICK

Most amazing are the myriad tricks performed by modern wire rope.

It lifts you from street level to skyscraper heights in seconds . . . hoists stone from quarries . . . helps build the highways, supports the giant suspension bridges over which you drive.

But this giant could not serve you until its muscles were made more flexible . . . protected against friction, rain, mud, even underwater service. Petroleum research solved these problems with a unique lubricant.

This kind of research, in which Texaco is a leader, provides benefits in swiftly built highways, great dams, tall buildings, giant bridges . . . progress on many fronts *to serve you.*

TEXACO

Progress . . . at your service

THE
TEXAS
COMPANY

HUDSON Combin-aire

LOW TEMPERATURE COOLING USING COMBINATION OF MINIMUM WATER AND MAXIMUM AIR

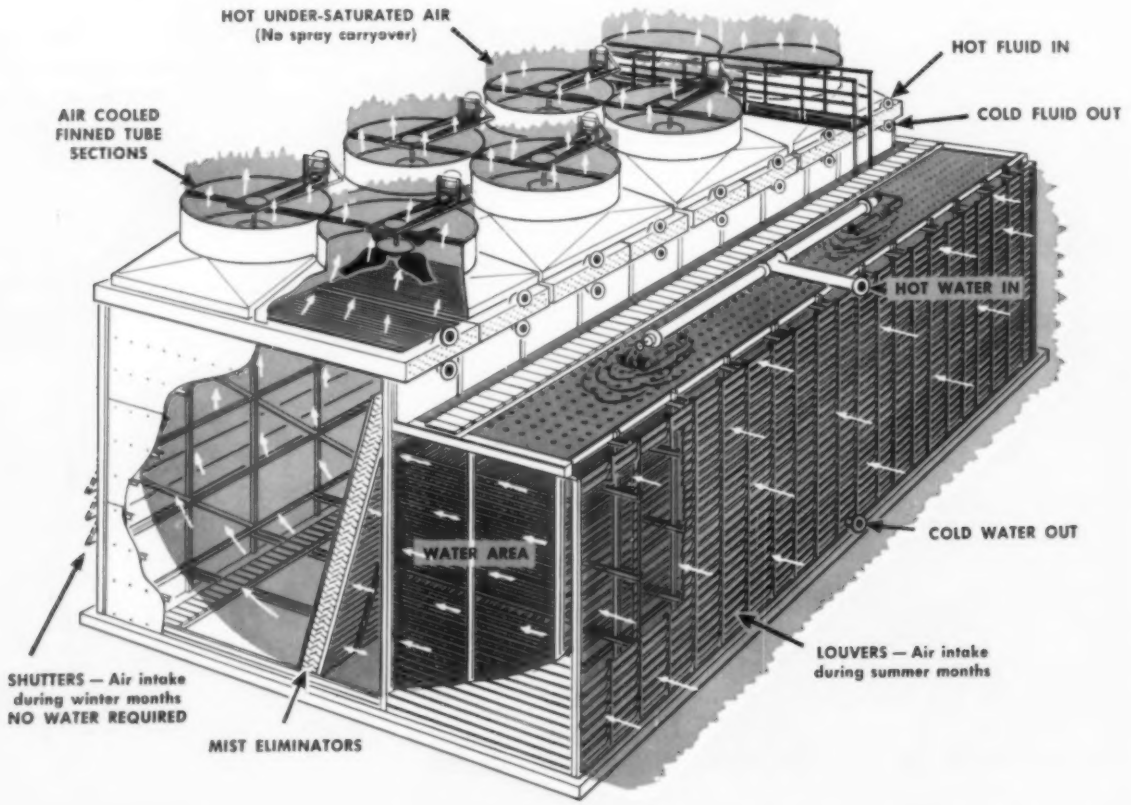
In recent years Hudson Solo-aire cooling in which only air is used as a cooling medium has been installed by the world's largest refineries. In recent cases of three separate 40,000 barrel complete refineries in locations where unlimited water is accessible Hudson Solo-aires are used for *all* process cooling.

So that air could be used for cooling those process streams requiring lower terminal temperatures than obtainable with ambient summer air temperatures, Hudson developed and in 1949 installed the first Combin-aire cooling unit. Since that time Combin-aires have proven their worth in installations for over 80 services in major refineries, chemical plants and gas processing plants in the United States, the Middle East, Europe, Mexico and South America.

In Combin-aire cooling, high temperature ambient air is first pre-cooled by direct contact with water, the cooled air then becoming the low temperature cooling medium for fin-tube elements. Cooling of air, and subsequent use of the cooled air for fin-tube cooling of process streams, are effected in one integrated structure — the Combin-aire.

Cooling with Combin-aire to overcome the occasional limitation of high ambient temperatures has the following advantages:

- **Absolute minimum water consumption consistent with attainment of low terminal process stream temperatures.**
- **Water circulation may be made automatically responsive to air temperatures with no water circulated except at high ambient temperature.**
- **No water treatment necessary. Salt water or brackish water may be used.**
- **No spray carryover or condensation. After passing across the fin-tube elements the heated air leaving the Combin-aire at elevated temperature is undersaturated with water vapor and cannot precipitate condensate or carry water spray.**
- **Minimum piping. Combin-aire may be installed immediately adjacent to other process equipment.**
- **Clean air to fin-tube units. During the hot season water is washed, removing dust, sand and insects.**



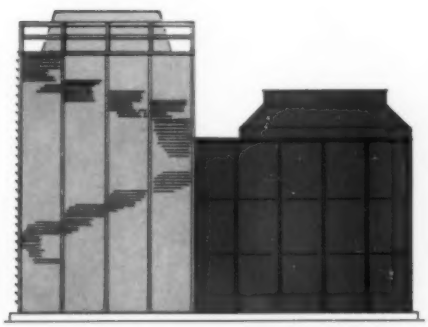
When Combin-aires are installed as adjuncts to cooling systems using existing shell and tube or other water cooled equipment the cooled water from the bottom of the Combin-aire may be used in such equipment. The Combin-aire then takes on the additional function of a water cooling tower with, however, the advantages over conventional cooling towers of dual use of both air and water and elimination of water spray carryover and condensate precipitation.

In over 80 services and under a wide range of atmospheric operating conditions Combin-aire units have amply fulfilled performance and mechanical specifications. Before proceeding with a new process unit or revamping or adding to present cooling systems let Hudson give objective assistance in determining the most economic balance in the use of air cooling, Combin-aire cooling and water cooling.

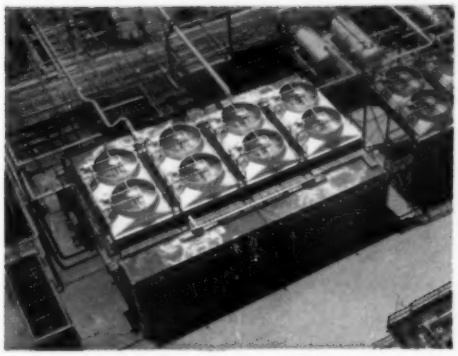
CONVERTING COOLING TOWERS INTO COMBIN-AIRE UNITS

Presently installed cooling towers may be used as the basis for Combin-aire cooling by installing structure with fin-tube elements and fans immediately adjacent to the cooling tower with air for the fin-tube elements being drawn across the water near the bottom of the cooling tower, thus increasing the capacity of the cooling tower, and cooling the air for use in the fin-tube elements.

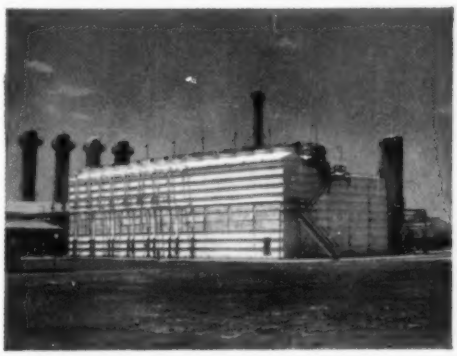
EXISTING COOLING TOWER **COMBIN-AIRE ADDITION**



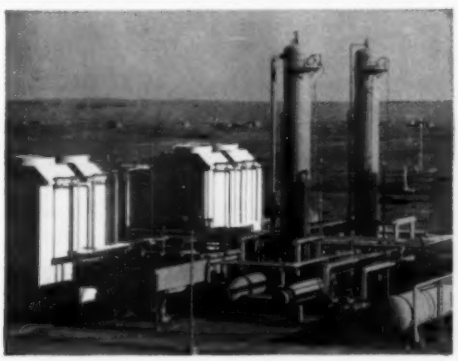
Combin-aire is protected by U. S. Patents, Patents pending and copyrights.



TEXAS —
COSDEN PETROLEUM CORPORATION
Big Spring, Texas



MEXICO —
PETROLEOS MEXICANOS
Reynosa, Tamaulipas, Mexico



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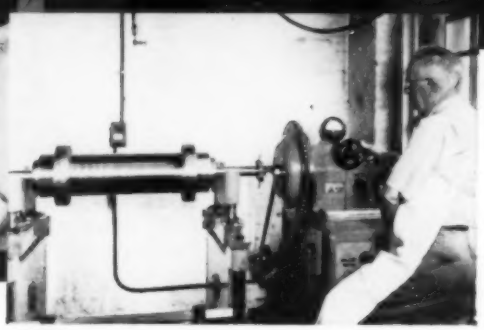
HIGH SPEED DRIVES CALL FOR

JOHN WALDRON High Speed Couplings

1 Unfinished forging for Waldron High Speed Coupling.

2 Machining operation on Waldron High Speed Coupling at New Brunswick Plant.



3 Dynamic Balancing of High Speed Coupling.

Today's high speed turbines and turbine-driven compressors are built like fine watches. They have to be to stand up under the terrific strains and stresses of the greater velocities. Good materials, accurate machining and balancing are essential to their service life and efficiency.

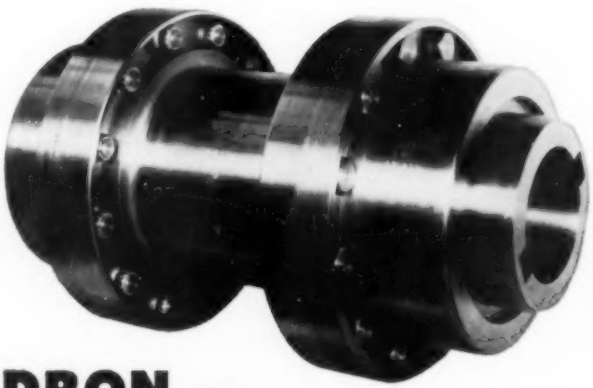
Equally important in the efficient operation of this equipment is the coupling—the power link between the turbine and the compressor. That's the reason for the extreme care in the manufacture of all Waldron High Speed Couplings.

John Waldron uses quality forgings made from SAE 4140 steel, heat treated to a Brinnell of from 285 to 315 on the outer sleeves and 225 to 255 on the hubs. This gives a good operating differential in hardness which is considered beneficial for the longer service life a high speed coupling requires.

The John Waldron method of balancing serves as a double check on the accurate machining. The nuts and bolts are all weigh balanced, the hubs are balanced separately and the complete unit is balanced on an arbor and match marked for ease in reassembly.

The result is a perfectly made and balanced coupling—and one that stresses material, workmanship and design.

4 Assembling High Speed Coupling.

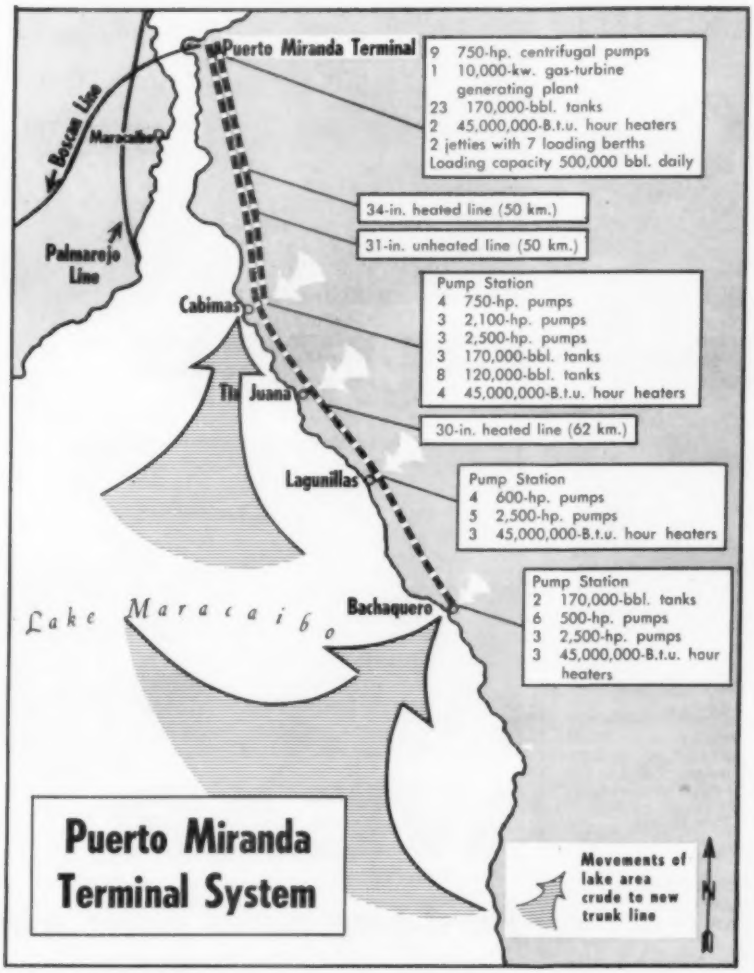


JOHN **WALDRON** CORP.

A unit of J. O. Ross Engineering Division
Midland-Ross Corporation
New Brunswick, New Jersey

Deep-draft supertankers will soon be able to use . . .

Maracaibo's new gateway to the sea



The existing, extensive oil-transportation system in Lake Maracaibo, which has been developed over a long period of time, was from the beginning dominated by one single factor. This factor was the depth of water at the exit from the lake to the sea. At this exit, only relatively small and shallow-draft tankers could pass.

It was logical, therefore, that the gradual expansion of production in the lake basin, over a period of many years, should bring about the construction of a number of small terminals along the lake shore. These terminals were naturally built to handle tankers of appropriate small capacity and shallow draft. The system worked well. Today, however, three factors have developed which render the existing facilities less satisfactory.

These factors are the completion, in 1956, of a deepwater channel at the mouth of the lake, built by the Venezuelan Government; the current tendency to build larger and larger tankers; and the growing difficulties of getting to a series of small terminals, which require vessels to navigate along narrow shipping lanes through an increasing number of busy offshore concession areas.

TO MEET changing conditions and to provide facilities for the direct exportation of crude oil cargoes by large tankers, the Cia. Shell de Venezuela is constructing a $100-million terminal on the Lake Maracaibo shore, near the exit to the sea.

This north terminal which will be called Puerto Miranda, is expected to be completed in 1960. The site was chosen because the port will always be accessible even to the largest tankers, and there is room for expansion if this is required in the future.

The crude-oil transportation and handling system now being built has called for the most careful, extensive, and forward-looking study. Oil will be taken from Shell's principal production areas on the east shore of the lake (Bachaquero, Lagunillas, Tia Juana, and Cabimas), from concessions in the lake itself and also from Shell's Boscan field on the west side of the lake.

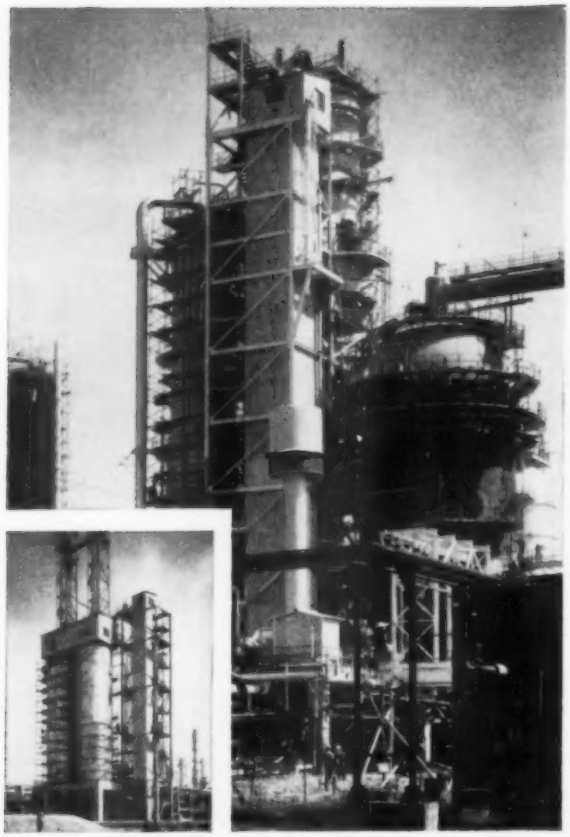
Some of the oil produced by the Mene Grande Oil Co. on the east side will also be handled. These crudes, which differ widely in physical characteristics, will be conducted by large-diameter pipelines to storage tanks at Puerto Miranda and thence shipped by the use of the most modern port facilities. It will be possible to accommodate tankers as large as 65,000 dw. tons.

Heating scheme . . . The trunk-line system serving the east shore of the lake has been designed for a capacity of 440,000 bbl. per day from Bachaquero to Cabimas and 880,000 bbl. per day from Cabimas to the terminal at Puerto Miranda. Pumping at these rates means heating of the heavy crudes to a temperature of up to 190° F. to reduce the viscosity to an acceptable level.

The heated-oil lines are placed underground with a minimum cover of 4 ft., which is the optimum depth for maximum heat conservation and for restraining the thermal expansion forces without, at the same time, infringing on the water table.

The lighter oils could be pumped cold, but this is not desirable because they would cause severe thermal shock on the line and cool not only the heavier hot oils, but also the surrounding ground and thereby increase the necessary pump horsepower required to maintain the desired pumping rate.

All oils in the 30-in. line from Bachaquero to Cabimas are therefore



Delayed Coking Section—Equipped with a Haughton elevator with 2000 lbs. capacity, 200 ft. per min. speed, automatic push-button control.

Fluid Catalytic Cracker Section—A Haughton elevator with 7000 lbs. capacity, 200 feet per minute speed and automatic push-button operation is the vital "transportation heart" of the unit.

At Standard Oil Refinery in Toledo . . .

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Installations of this type present some of the trickiest problems encountered in elevator design and installation, but Haughton takes them all in stride. That's why leading companies in every industry seek the outstanding advantages offered by Haughton engineering and teamwork.

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Hard-face pump parts with the Colmonoy Spraywelder

Your pump plungers, pistons, rings, bushings—all your pump parts—will last longer with corrosion and abrasion resistant Colmonoy alloy hard-facing.

You apply these alloys fast—with the Colmonoy Spraywelder. This powder spraying unit produces smooth overlays, within .010" of desired size. They are welded to the base metal and require a minimum of finishing.

You'll save handsomely by either eliminating expensive corrosion resistant metal components, or by eliminating the time consuming hand application of hard-facing rod and the attendant difficulties in distortion and machining. Write today for more information on how you can use the Spraywelder.

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"All . . . services normally required at loading terminals, such as deballasting and skimming facilities, bunkering facilities, supply of potable water, and fire protection, will also be provided at Puerto Miranda."

heated. From Cabimas to Puerto Miranda two lines will be laid; a 34-in. line to transport the heavy, heated oils and a 31-in. line for the lighter, cold oils which will not require reheating at Cabimas.

Line operation . . . At Bachaquero the existing facilities are completely integrated into the new design of the north terminal scheme, but two additional storage tanks will have to be provided.

Under normal operating conditions the new station will deliver at a rate of 465,000 bbl. per day against a delivery pressure of 365 psi. The difference between the indicated delivery rate and the nominal line capacity reflects a service factor of 0.95, which is at all times incorporated into the design. Three identical main-line centrifugal pumps, each rated at 465,000 bbl. per day, and driven by 2,500-hp. electric motors, will be installed. Two pumps will operate in series, with the third in reserve as a spare.

To provide sufficient pressure at the inlet of the main-line pumps and to boost the oil through, three 46×10^6 B.t.u. per hour capacity heaters and six electrically driven centrifugal booster pumps of 500 hp. each will also be installed.

At the Lagunillas station, five identical main-line pumps will operate at a pumping rate similar to Bachaquero, but against a delivery pressure of 665 psi.

The Bachaquero crudes will arrive at Lagunillas with sufficient residual pressure to overcome the heater losses and furnish adequate NPSH for the mainline pumps. It will, however, be necessary to boost crudes from Lagunillas tank farm through three 46×10^6 B.t.u. per hour heaters and for this service a further six electrically driven booster pumps, each of 600 hp., will be used.

The crude oil received from Bachaquero will be pumped by the main-line pumps in closed-line procedure, without going to storage tanks. The Lagunillas pumps will therefore handle alternatively Bachaquero and Lagunillas crudes. The Cabimas pump station and tank farm are located at a site situated about 8 km. east of the town of Cabimas. Three 170,000 and eight 140,000-bbl. floating-roof tanks will provide storage for Cabimas, Tia Juana, and lake oils.

Cabimas station will deliver the crude to Puerto Miranda in two lines. Rated line conditions are: 440,000 bbl. per day at 395 psi. for the 34-in. hot line and 400,000 bbl. per day at 455 psi. for the 31-in. cold line. Six main-line pumps will pump the Cabimas crudes as well as the transit crudes through the appropriate lines to Puerto Miranda. Three pumps will operate in series on the cold line, two on the hot line and the sixth unit will be manifold as a common spare. The pumps will be driven by 2,100-hp. and 2,500-hp. electric motors, respectively.

Four booster pumps of 700 hp. each will serve a similar purpose to the pumps at Lagunillas, but four 46×10^6 B.t.u. heaters will be required to provide the necessary heat input to raise the crude temperature prior to pumping the oil from Cabimas to Puerto Miranda.

Terminal facilities . . . At Puerto Miranda up to 12 different crudes from the Bolivar Coast will be received into 23 170,000-bbl. floating-roof storage tanks and 2 46×10^6 B.t.u. heaters will permit reheating of the heavy crudes whose temperatures drop to undesirable levels during storage.

Nine loading pumps capable of delivering at a rate of 4,000 tons per hour will be installed in three groups, situated as near as possible to the tanks from which they take their suction; six will be used for the heated oils and three for the lighter, cold oils. No specific standby pumps are incorporated in the design but it is anticipated that it will be possible to use the pumps indiscriminately as and when required.

Initially only two jetties, one of 330 meters and the other of 370 meters, will be built. They will be able to accommodate up to seven tankers simultaneously, including one tanker of 65,000 dwt. The oil will be transported from the loading pumps to the power-operated loading arms through eight 30-in. lines, which will be without designation as to crude carried, but will be divided into heated and cold lines in the same ratio as the volume of the relative crudes produced.

All other services normally required at loading terminals, such as deballasting and skimming facilities, bunkering facilities, supply of potable water, and fire protection, will also be provided at Puerto Miranda.

In addition to loading the crudes from the Bolivar Coast, a heavy crude from the Boscan fields on the west side of Lake Maracaibo will be received through a 16-in. pipeline and will also be loaded over the Puerto Miranda jetties. The storage tanks, loading pumps, and heaters for this crude are independent of the north terminal facilities and only a portion of the main loading lines and dock installation will be used.

To cope with the increased power demands as a result of the construction of the north terminal one of Shell's existing power plants on the Bolivar Coast will be extended. Puerto Miranda will have its own power supply independent of the company's Bolivar Coast distribution system and it is planned to erect a 10,750-kw. power plant at the terminal site.

Automatic controls . . . An interesting feature of the terminal is the automatic control which has been incorporated into the design at all stations to provide:

1. Automatic tank level and temperature gages printing and transmitting the required information at regular intervals.
2. Flowmeters continuously indicating all the main flow rates at a central control room.
3. Instruments using the crude's dielectric constants as an index used to check oil interfaces.
4. Gate valves remotely controlled, synchronised, and power-operated.
5. Automatic safety shutdown devices on all the main lines and heaters.
6. Valves fitted with interlocks to prevent starting of the centrifugal pumps while the suction valves are closed.

Numerous other safety controls are also built into the design and these will ensure satisfactory operation, even during an emergency breakdown of part of the installation.

Communication, for administration and for operational control, will be available on clear channel voice and teletype circuit.

The Boscan part of the Puerto Miranda installation is already in operation and construction of the remainder of the project is now well under way. A part of the installation to handle up to 350,000 bbl. per day will be completed and in service early in 1959.

On the Job

IN THE PLANTS

PART 2 (CONCLUSION)

Here are

Three ways to boost operations

BY LARRY RESEN
District Editor

SEVERAL ADVANTAGES were realized from altering the regeneration procedure at Goliad Corp.'s Wilcox gasoline plant near Provident City, Tex.

A total of 8 beds, rather than 6.85, are regenerated within a 24-hour period.

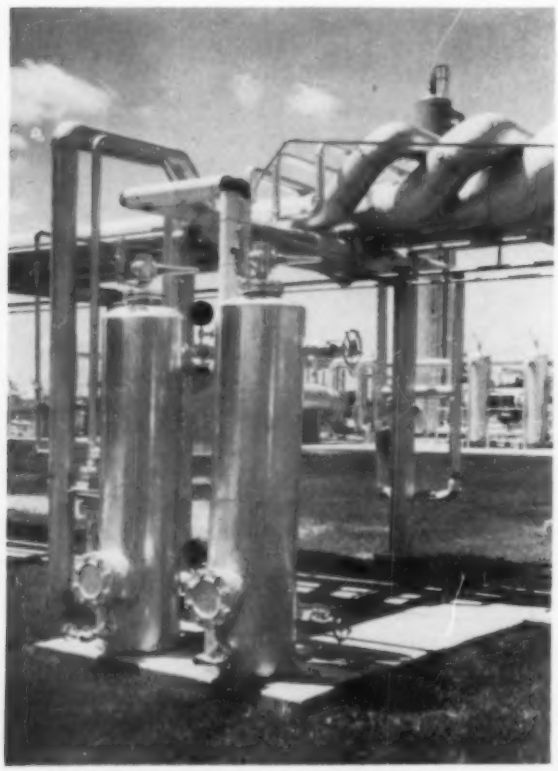
Gas flow through the beds is at the reduced rate of 8.4 M.M.c.f. per day rather than 11 M.M.c.f. as before. However, since the entire 8.4 million is maintained on one bed for 3 hours rather than being split across two beds for 4 hours, more gas is charged to each bed during the heating cycle. Presently, a total of 1.05 M.M.c.f. is charged to each bed for heating as opposed to 0.917 M.M.c.f. before.

Excessive pressure drop is no problem, since there has been almost a 50% reduction in the flow rate through the regeneration facilities. The heater, which was being used only 4 out of 7 hours is now used throughout the day. At the same time, using the incoming gas for cooling a bed helps to ease the load on the heater itself.

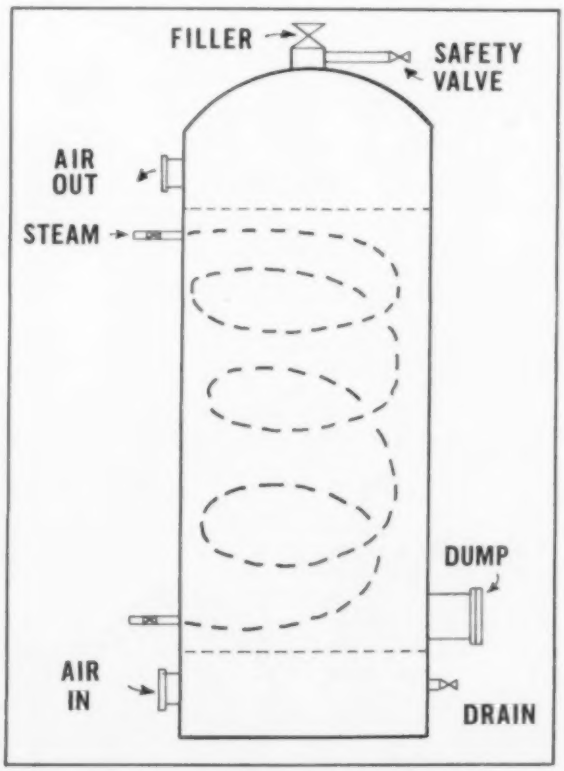
The conversion of the gas-to-gas exchanger to a water-gas exchanger has resulted in an increased water knockout. Previously, the gas-gas exchanger would be inoperative during the cooling cycle. Hence, only the one water cooler was available to lower the gas temperature.

It was only possible to get the regeneration gas down to about a temperature of 125° before it passed through the scrubber. Now this temperature can be reduced to a maximum of 100°. There is a marked increase in the amount of water which can be removed at this lower temperature. This means less water recycle is passed back through the dehydrators with the main gas stream.

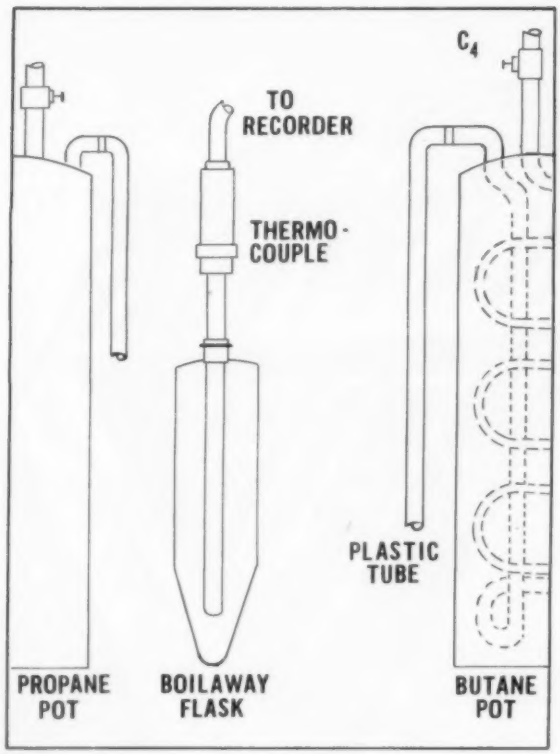
Charging the cooling gas to the dehydrator concurrent to the normal gas flow is beneficial. As noted, wet gas is used for this purpose. The desiccant naturally acts to dehydrate this cooling gas as it passes through the bed. When the cooling gas was charged countercurrently, the downstream portion of the bed would retain the recovered moisture.



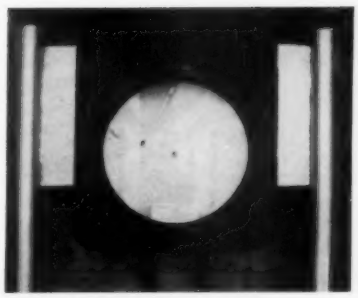
A HIGH VOLUME of instrument air is handled in this pair of bead-packed driers.



A LENGTH of 14-in. steel pipe was capped at both ends to make the bead-packed drier. Fig. 1.



BOILAWAY test installation shows taps are made to butane and propane-product stream lines within the process unit. Fig. 2.



TEST TEMPERATURES for boilaway operations are recorded on this remote temperature recorder.

When the main gas stream was then turned into the bed, the tendency would be for this gas to pick up some of the moisture from the downstream layers and carry it on out of the plant. The dew-point recorder would show this condition by recording a "kick." Under the present setup, the moisture recovered from the cooling gas accumulates at the inlet of the bed.

Hence, the incoming gas passes through the partially saturated portion of the bed, and then through the entire remaining bed before leaving the plant. Moisture will thus be completely retained within the dehydrator.

Instrument air . . . An instrument-air drier was made by capping a large section of big-diameter pipe and packing it with a desiccant. Goliad is using a pair of these driers to successfully dry a large volume of air and also to filter out any oil which might be carried over from the air compressor.

A length of 14-inch steel pipe was selected and capped at both ends to provide a closed vessel (Fig. 1). Stainless-steel mesh screens were installed within the vessel. These 1/64-in. mesh screens are supported by perforated plates and are located a bit above the bottom of the vessel and somewhat below the top of the vessel.

In this manner, two chambers are provided for air entering and leaving the drier. The space between the two perforated plates is filled with 400 lb. of bead desiccant, with the mesh screens serving to prevent the desiccant particles from getting into the air stream.

Air enters the lower chamber beneath the bed, passes up through the bed into the upper chamber, and then out into the instrument-air system. Normally, a bed is on stream 24 hours and then regenerated 24 hours. Regeneration is accomplished by heating the bed through introduction of steam within a ½-in. steel coil located in the bed.

The steam raises the temperature of the bed to 230° within a 6-hour period, which is sufficient to drive out the collected moisture. The bed is allowed to cool naturally. During the regeneration procedure, a valve is opened on the top of the vessel through which moisture can escape.

This valve is connected to the upper perforated tray through a riser. This line has been installed primarily for filling purposes. A flanged outlet near the bottom of the vessel is available for dumping the desiccant.

No new desiccant has been added since the original charge was made about 12 months ago. Instrument air has been properly dried and satisfactory operations have been the result of this installation.

Boilaway recordings . . . Human errors on boilaway tests can be eliminated through use of a thermocouple to pick up boilaway temperatures and the recording of these readings on a conventional temperature recorder.

The recorder is located some distance from the process area for safety purposes. Taps are made to butane and propane-product stream lines within the process unit (Fig. 2). By means of a valve on these taps, the liquefied gas can be turned into a coil within a pot. Outlet of the coil is a plastic tube, so that the pot can be filled with liquid which will then serve to chill the test tube and the product stream due to be measured. The boilaway test tube is held by a clamp. Once the tube is filled with liquid, the thermocouple is inserted and held in position by a rubber stopper.

As the liquid evaporates, the changing temperature is picked up by the thermocouple and transmitted to the recorder. As the test proceeds, the temperature is continually recorded, and the operator is free to attend to any plant needs which may require his immediate attention. He can do this without having to be concerned about missing the temperature readings as is the case in a conventional test procedure using a thermometer.

The chart used is a 24-hour chart, although an 8-hour chart is being considered which would provide a broader spread upon which the temperature readings would be plotted. The initial-boiling-point plot requires a bit of interpretation since the temperature is changing so rapidly. However, with the end point being the most important reading, this factor is not too critical. Again, an 8-hour chart would be that much better in these instances.

In addition to eliminating the need to tie down an operator while making boilaway tests, the chart provides a permanent record of the tests as made.

Acknowledgments . . . Cooperation of the management of Goliad Corp. is gratefully appreciated as is the assistance rendered by C. C. Blanchard, Wilcox plant superintendent, and G. H. Dunn, Jr., chief project engineer.

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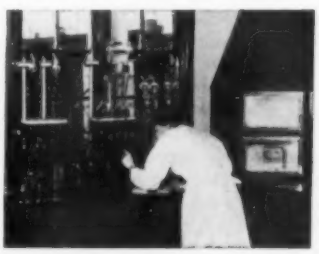

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West Chester, Pa.

Cost of steam varies widely

. . . and extent of reuse has great bearing on total cost

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

APPALLING VARIATIONS in the cost of steam appear in the literature (see Fig. 1). Reasons for the discrepancies are the great variation in the cost of fuel, the amount of steam that is reused (see Fig. 1), and the inclusion or exclusion of financial charges such as interest on replacement value, insurance and property taxes, and obsolescence. The steam costs derived and used in this and other issues of the Process Costimating series apply to either live steam (160 to 500 psi.) superheated by 80°-230° F. or to exhaust steam, and the following items are included in the cost:

Fuel.
Treated feed water.
Operating labor and supervision.
Maintenance, labor and materials.
Interest on investment.
Insurance and property taxes.
Obsolescence.
Overhead and miscellaneous.

Pressure in the normal ranges (125-600 psi.) has little effect on the cost of steam. Slightly more fuel, slightly more investment, and somewhat larger maintenance costs are encountered (perhaps 10%) at high pressures. Exhaust steam represents slightly less fuel but sometimes requires deoiling or superheating so that its value is scarcely lower (perhaps 5%). However, in the interest of simplicity, the cost of live steam and exhaust steam is herein considered to be the same, although the cost of all of the steam (live or exhaust) is greatly affected and reduced by the amount of reuse of steam as exhaust steam. The total cost is reduced exactly in proportion to the amount of reuse. Thus if half of the live steam is reused as exhaust steam, the cost of steam (cents per 1,000 lb.) is reduced to two-thirds.

The use of high-pressure (600-1,400-psi.) steam to generate electrical power, or to drive blowers, pumps, etc., is not considered as reuse of steam. The use of steam in this manner will be discussed in Process Costimating No. 19.

The cost of steam for any particular set of conditions can be computed as follows:

● **Fuel cost**—1,770,000 B.t.u. of gross heating value is required to generate 1,000 lb. of steam. If all adverse factors combine, the heat required may approach 2,100,000 B.t.u., and under the most favorable conditions for all factors, only 1,500,000 B.t.u. may be required. These extremes are never encountered. The price of fuels was dis-

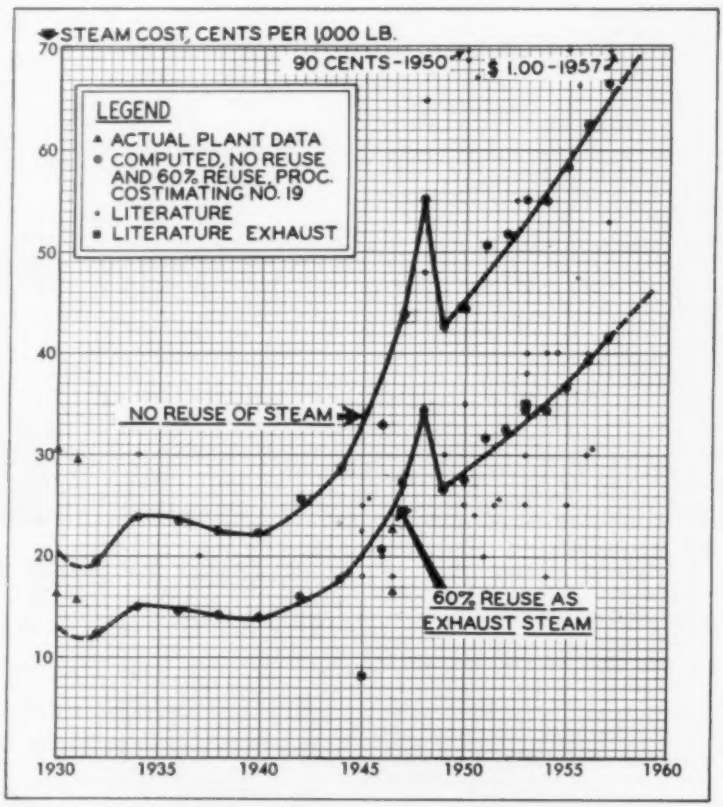

FIG. 1—Cost of steam since 1930, cents per 1,000 lb.

cussed in Process Costimating No. 3 (March 10, 1958, p. 197), No. 4 (March 17, 1958, p. 190), and No. 6 (throughout the world, March 31, 1958, p. 99).

● **Feed water**—Less than 130 gal. is required. The cost of raw water and of water treating was discussed in Process Costimating No. 16 (June 16, 1958, p. 123). The cost (1956) usually ranges from 18 to 35 cents per 1,000 gal. Chemicals for treatment are a major cost, and current indexes of industrial chemical costs are published each quarter on the Itemized Cost Indexes page of The Oil and Gas Journal.

● **Operating labor**—This, including supervision, is considered as two men (one shift) plus one-half man per shift for each 100,000 lb. per hour of steam capacity. This amounts to only the equivalent of one and one-half men per shift for the average 30,000-bbl. per day refinery. In many refineries the labor cost is more than double the amount used here. However, one modern plant[38] uses only about one man per shift per 100,000 lb. capacity, but three-fourths man for power generation. Indexes of refinery labor costs are also published on the Itemized Cost Indexes page of The Oil and Gas Journal. Additional shift operators are required if power is generated (see Process Costimating No. 19).

● **Maintenance labor**—This amounts to about one-third of the operating labor although in many older plants the cost may approach one-half.

● **Maintenance materials** — Although the literature[35 36 37] indicates that about 55% of the total maintenance cost is composed of materials, in this series the maintenance materials and the maintenance labor are considered as equal. Materials costs can be corrected to other years by use of the Materials Component of the Nelson Refinery Construction Cost Index (first issue each month in The Oil and Gas Journal) or from the many other materials indexes that are available.

● **Financial charges**—These and miscellaneous costs are a function of the replacement (investment) cost of the installation. Four per cent per year was allowed for interest or dividends, 2% for insurance and property taxes, 2% for obsolescence, and 2% for miscellaneous (a total of 10%). One-fourth of the investments represents only standby peak-load capacity. Investment costs are shown in Cost-imating No. 14, Cost of Steam Generation Equipment (July 16, 1956) and No. 22 (old series) Cost of Buildings (March 17, 1949). Power-generation equipment (Cost-imating No. 17, August 27, 1956) is not included in the cost of steam but such use will be discussed in Process Costimating No. 19, and costs are included here as part of Table 1.

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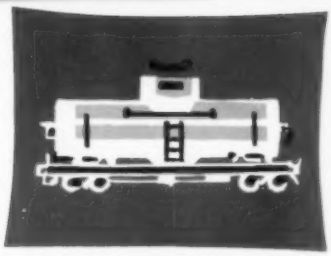
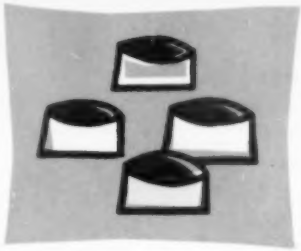
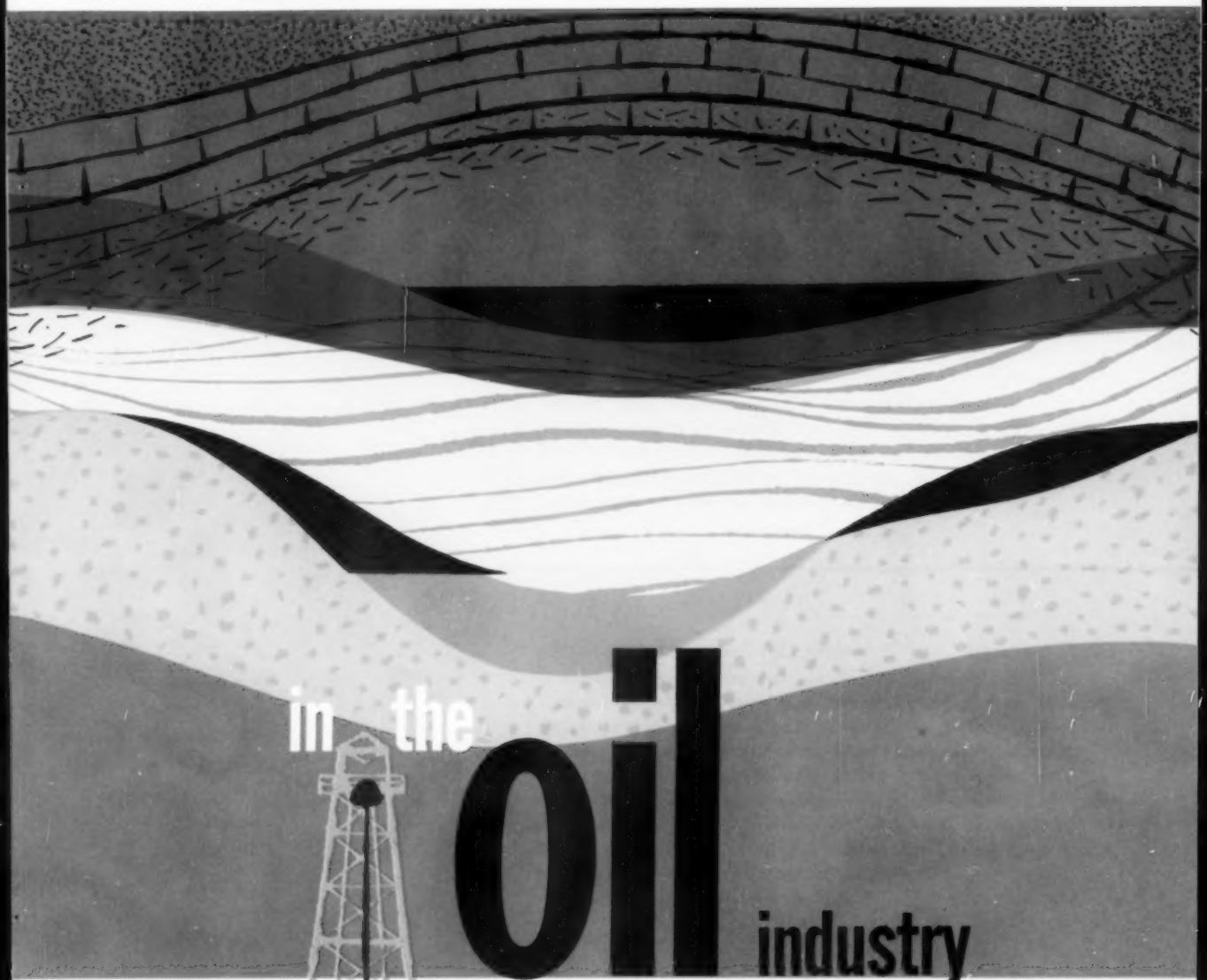
TABLE 1—COST OF INSTALLED STEAM PLANTS AND GENERATORS (APPROXIMATELY*)
(Thousands of dollars)

	Steam plants including buildings (lb. per hr.)			Generators (kw.-hr.)		
	100,000	300,000	500,000	3,000	5,000	20,000
1930	†169	†338	†470	234	355	1,205
1932	†137	†274	†381	204	310	1,050
1934	†148	†297	†413	211	320	1,090
1936	†162	†324	†450	228	345	1,170
1938	†162	†324	†450	244	370	1,260
1940	†162	†324	†450	248	375	1,275
1942	†180	†361	†502	274	415	1,410
1944	†185	†370	†515	290	440	1,495
1946	228	457	635	330	500	1,700
1947	270	540	750	376	570	1,940
1948	296	593	825	423	640	2,180
1949	305	612	852	443	670	2,280
1950	320	640	890	460	695	2,360
1951	340	680	948	512	774	2,640
1952	350	700	973	522	790	2,690
1953	362	727	1,010	541	820	2,790
1954	374	750	1,042	559	845	2,870
1955	386	772	1,073	581	880	2,990
1956	430	862	1,200	617	935	3,180
1957	456	914	1,270	660	1,000	3,400

*All must be approximate, especially before the year 1946. †Using the Marshall-Stevens steam-power index.







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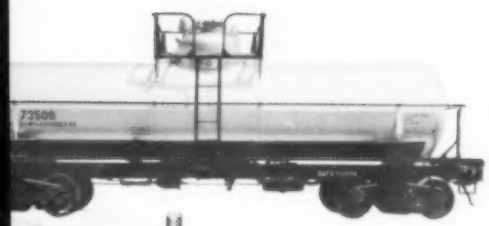

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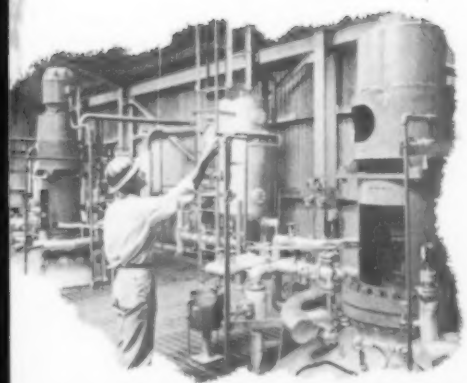

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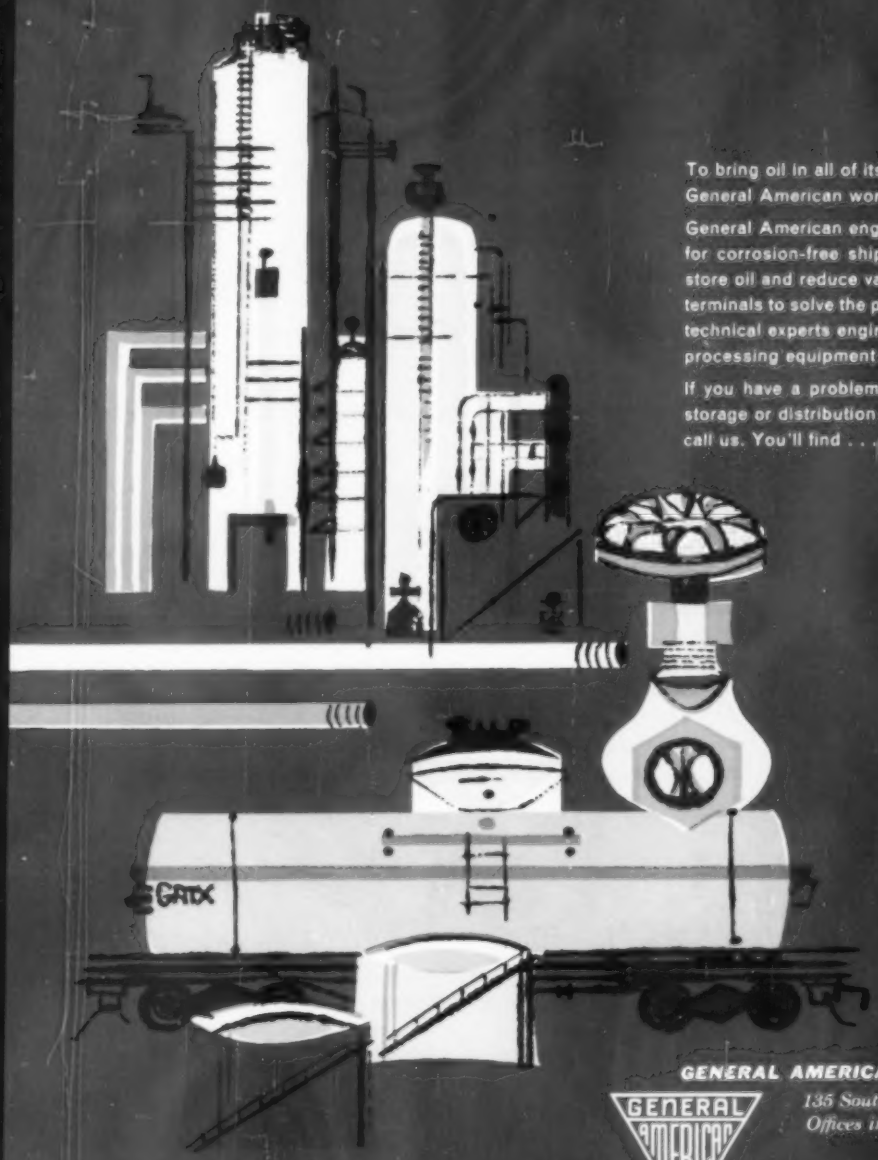

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PIPELINE

CONSTRUCTION REPORT

Who's Laying Line—and Where

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way.

U.S. Crude-Oil Pipelines

• **Belle Fourche Pipeline Co.**
Project: 30 miles of 6-in. from Donkey Creek pool to Fiddler Creek pool in northeastern Wyo. Will later build a line from Fiddler Creek to connect with Butte Pipe Line Co. near Osage, Wyo.
Status: Planned.

• **Big Horn Pipeline Co.**
Project: 150-mile line from Ash Creek field, Sheridan County, Wyoming, to Midwest, Wyo.
Status: Pending Wyoming Public Service Commission approval.

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.)
Project: Line from lower Delaware Bay to Philadelphia.
Status: Planned.
Completion: 1960.

• **Gillette Pipeline, Inc.** and **A. W. Hartwig, Inc.**
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Has applied for permit from Wyoming Public Service Commission.

• **Great Northern Railway Co.**
Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Montana and North Dakota, to Clearbrook or St. Paul, Minn.
Status: Planned.
Contractor: **Pipe Line Technologists, Inc.** has completed feasibility study.

• **Jayhawk Pipeline Corp.** (Colorado Oil & Gas Corp., National Cooperative Refinery Association)
Project: 197 miles of 12-in. from Meade to McPherson, Kans., and 42 miles of 10-in. from McPherson to Valley Center, Kans.
Status: Under way.
Contractor: **R. H. Fulton & Co.**, Lubbock, Tex.
Completion: September 1, 1958.

• **International Oil Pipeline Corp.**
Project: International would own U.S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton to Chicago.
Status: Permit for Canadian section sought from Canadian Board of Transport Commissioners.

• **Kaycee Pipe Line Co.**
Project: Line from North Fork field to Midwest, Wyo.
Status: Pending Wyoming Public Service Commission approval.

• **Magnolia Petroleum Co.**
Project: 22 miles of 16-in. line offshore Louisiana, to move gas and condensate from West Cameron area.
Status: Under way.
Contractor: **Brown & Root, Inc.**
Completion: Fall 1958.

• **Offshore Gathering Corp.**, Houston.
Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana. (Dual line.)
Status: Proposed.

• **Service Pipe Line Co.**
Project: 30 miles of 12-in. from North Fork field, Wyoming, to the Salt Creek pump station.
Status: To start July 1, 1958, pending Wyoming Public Service Commission approval.
Project: 41 miles of 20-in. looping from Fort Laramie to Glendo Junction, Wyo., and 35 miles of 20-in. looping from Welch to connect with system at Casper, Wyo.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.**, Floyd Lewis, supt.
Completion: Fall 1958.

• **Shell Oil Co.**
Project: 20 miles of 6-in. from Vallecitos field in eastern San Benito County to main Bakersfield-to-Martinez line in Fresno County, California.
Status: Planned.
Completion: Late July 1958.
Project: Undetermined mileage of 2, 3, and 4-in. flow lines in Mississippi River Delta area under 6-month contract.
Status: Under way.
Contractor: **Brown & Root, Inc.**
Completion: September 30, 1958.

• **Shell Pipe Line Corp.**
Project: 2 miles of 6-in., 11 miles of 8-in., 11 miles of 12-in., 29 miles of 16-in., and 64 miles of 20-in. from Mississippi River delta area to New Orleans refining area.
Status: Planned.
Contractor: **Coates Field Service, Inc.**, has right-of-way acquisition and claims settlement.
Completion: December 1958.

• **Sinclair Pipe Line Co.**
Project: 150 miles of 20-in. from Teague, Tex., to Houston.
Status: Under way.
Contractor: **Lone Star Constructors, Inc.** has 143 miles; **Golightly Construction Corp.** has 6 miles.
Completion: July 1, 1958.

• **Union Oil Co. of California**
Project: 1 mile of 30-in. from proposed outer harbor terminal to Los Angeles outer harbor wharf, and 4 miles of 12-in. crude and bunker fuel line from proposed outer harbor terminal to Union's Los Angeles refinery.
Status: Planned.

U.S. Products Pipelines

• **Alaska-Yukon Refiners & Distributors, Ltd.**
Project: Two lines: one 150 miles from Haines to Haines Junction, Alaska, linking with government Canol line; another from Tok Junction, on Canol line, to Anchorage.
Status: Proposed.
Completion: 1959.

• **Buckeye Pipe Line Co.**
Project: 50 miles of 10-in. from Syracuse to Utica, N. Y.
Status: Under way.
Contractor: **Sheehan Pipe Line Co.**
Completion: September 1958.

• **Cherokee Pipe Line Co.** (Continental Oil Co., Cities Service Oil Co.)
Project: 78 miles of 12-in. from Ponca City to Tulsa, Okla.
Status: Under way.
Contractor: **Pipeline Service Co.**
Completion: Summer 1958.
Project: Conversion of 400 miles of 10-in. crude line between Glenpool, Okla., and Wood River, Ill.
Status: Under way.
Completion: Summer 1958.

• **Columbia Gas System, Inc.**
Project: 37 miles of 6-in. from Kenova, W. Va., to Siloam, Ky.
Status: Proposed.

• **Emerald Pipe Line Corp., Phillips Petroleum Co., and The Texas Co.**
Project: 300 miles of 6-in. from Amarillo, Tex., to Albuquerque, N. M.
Status: Under way.
Contractor: **Arey Pipe & Construction Co., Inc.**, Pampa, Tex., has 105 miles from Amarillo to Tucumcari, N. M.

• **Everglades Pipe Line Co.**
Project: 35 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport.
Status: Engineering study under way.
Completion: Late 1958.

• **Katy and New York Central Railroads**
Project: 2,000 miles of 10 or 12-in. from Houston through Kansas City, St. Louis Indianapolis and Cleveland to Syracuse then down to New York City. A branch would go through Chicago to Detroit.
Status: Planned.
Contractor: **Williams Brothers Co.** has feasibility study.
Completion: November 1, 1959.

• **Laurel Pipe Line Co.** (Gulf Refining Co., Sinclair Pipe Line Co., The Texas Co.)
Project: 100 miles of 24-in. and 340 miles of line graduating down to 14-in. at the west terminus, from Philadelphia to Cleveland.
Status: Under way.
Contractor: **Pipe Line Maintenance & Construction Co.**, Camp Hill, Pa., has Susquehanna River crossing. **Missouri Valley Dredging Co.**, Omaha, Neb., has 6 miles of 24-in. from Eagle Point, N. J., to west bank of Delaware River, including Delaware River crossing, and 20 miles of 24-in. from west bank of Delaware River to Laurel's Booth station site in Delaware County, Pennsylvania. **Engineers Limited Pipe Line Co.**, San Francisco, has 106 miles of 24-in. from Booth station to Mechanicsburg station near Harrisburg, Pa. **Panama, Inc.**, Houston, has 78 miles of 20-in. from Mechanicsburg station to Duncansville station and 113 miles of 18-in. from there to Aliquippa station in Beaver County, Pennsylvania, including Allegheny and Ohio rivers crossing. **Williams Brothers Co.**, Tulsa, has 106 miles of 14-in. from Aliquippa station to Cleveland.
Completion: August 1958.

• **Phillips Petroleum Co.**
Project: 44 miles of 8-in. from Rocky Pump Station to Amarillo, Tex.
Status: Under way.
Contractor: **Brodie Construction Co.**

• **Underground Storage & Exploration, Inc.**
Project: 393 miles of 12-in. L.P.G. line from Moundsville, W. Va., to Newark, N. J., plus 95 miles of 6, 8-in. laterals to Mauch Chunk, Pa., and to Philadelphia.
Status: Proposed.

• **Union Oil Co. of California**
Project: 2 miles of 12-in. bunker fuel line from proposed outer harbor terminal to Los Angeles outer harbor wharf, and 4 miles of 12-in. crude and bunker fuel line from proposed outer harbor terminal to Union's Los Angeles refinery.
Status: Planned.

• **Wabash Pipe Line Co.** (Ohio Oil Co. and Continental Oil Co.)
Project: 265 miles of 12-in. from Wood River, Ill., to East Chicago, Ind.
Status: To start July 1958.
Completion: 1958.

PIPELINE CONSTRUCTION

U.S. Natural-Gas Pipelines

• **American Louisiana Pipe Line Co.**
Project: 7 miles of 16-in. and 5 miles of 12-in. from Second Bayou to Cameron, La.
Status: Under way.
Contractor: **Ford, Bacon & Davis Construction Corp.**
Completion: December 1958.

• **Arkansas Louisiana Gas Co.**
Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.
Status: Proposed.

• **Carnegie Natural Gas Co.**
Project: Two parallel lines to provide coke-oven gas to six Pittsburgh area plants: 9 miles of 55-in. and 4 miles of 43-in. each
Status: Under way.
Contractor: **Williams Brothers Co.**
Completion: January 1, 1959.

• **Chicago District Pipeline Co.**
Project: 52 miles of 30, 36-in. between Joliet and Chicago, Ill.
Status: Approved by FPC examiners.
Completion: 1958.

• **Coastal States Gas Producing Co. and Southern Coast Corp.**
Project: 45 miles of 2 to 10-in. in Bee County, Tex. to connect presently shutin fields with Texas Eastern Transmission Corp.'s system.
Status: Planned.

• **Coastal Transmission Corp.**
Project: 94 miles of 12-in. between Monte Christo, Tex., and Robstown, Tex.; 175 miles of 20-in. between Robstown and Lochridge, Tex.; 102 miles of 22-in. between Lochridge and Beaumont, Tex.; 193 miles of 24-in. between Beaumont and Baton Rouge, La.
Status: Approved. Survey and right-of-way work under way.
Completion: February 1, 1959.
Project: 365 miles of 3 to 14-in. gathering lines at various locations on Texas and Louisiana Gulf Coast.
Status: Approved.
Completion: February 1, 1959.

• **Colorado Interstate Gas Co.**
Project: 66 miles of 30-in., 40 miles of 34-in., 109 miles of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pubelo Colo.; 345 miles of 30-in. from Kit Carson Colo., to Beatrice, Neb.; 24 miles of 22-in Tex. Panhandle looping.
Status: Approved by FPC examiners. Delayed until 1959.

• **Commonwealth Natural Gas Corp.**
Project: 16 miles of 12-in. from Waverly to southeast of Wakefield, Va.
Status: Planned.
Completion: July 1, 1958.
Project: 13 miles of 18-in. from Chester to Petersburg compressor station in Va.
Status: Planned.
Completion: September 1, 1958.

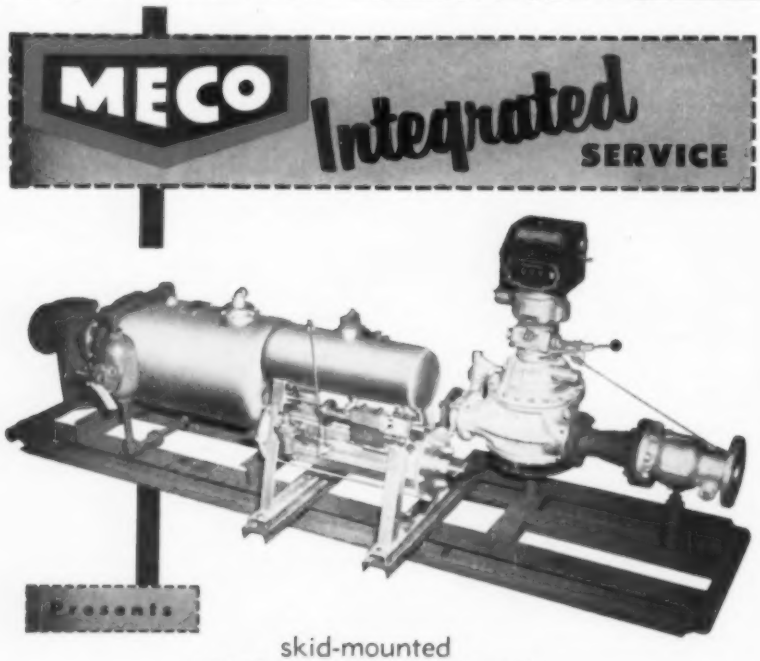
• **Consolidated Gas Utilities Corp.**
Project: 21 miles of 12-in. and 10 miles of 4-in. at Altus, Okla.
Status: Approved.

• **Consumers Power Co.**
Project: 45 miles of 24-in. from Overisel field to Lansing Gas system in Mich.
Status: Under way.
Contractor: **Midwestern Constructors, Inc.**
Completion: September 1, 1958.
Project: 45-mile, 24-in. line from Woodbury station to Laingsburg Junction, Mich.
Status: Planned for 1959.

• **Eastern Shore Natural Gas Co.**
Project: 34 miles of 8-in. and 90 miles of 6-in. from connection with Transcontinental Gas Pipe Line Corp., in Maryland, across entire length of Delaware to Salisbury.
Status: Approved.

• **El Paso Natural Gas Co.**
Project: 177 miles of 20-in. from Sonora plant, Sutton County, to Plains plant, Yoakum County, Texas.
Status: Under way.
Completion: August 1, 1958.
Project 203 miles of 30-in. Permian-San Juan crossover loops.
Status: Under way.
Completion: September 1, 1958.
Project: 13 miles of 20-in. and 66 miles of 16-in. Aneth line.
Status: Approved.
Completion: September 1958.
Project: 74 miles of 10-in. Yuma line loop.
Status: Has temporary approval.
Completion: August 1958.
Project: 500 miles of 34-in. from Twin Falls, Idaho to California border near Las Vegas, Nev.
Status: Planned.
Completion: September 1, 1959.
Contractors: **R. H. Fulton & Co.**, Lubbock, has 76 miles of 30-in. on Permian-San Juan crossover and 117 miles of 20-in. in West Texas; **McVean & Barlow, Inc.**, Odessa, has 110 miles of 20-in. in West Texas; **Western Pipelines, Inc.**, Austin, has 20 miles of 34-in. and 22 miles of 26-in. loops in Arizona.
Project: 1,000 miles of main line loop from Plains, Tex., to California border.
Status: Planned.
Completion: 1960.

• **Gulf Interstate Gas Co.**
Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, Louisiana, and 9 miles of various size field lines in Acadia and Vermilion parishes, Louisiana.
Status: Approved.



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PIPELINE CONSTRUCTION

Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, Louisiana, and 3 miles of 6-in. loop in Cameron Parish, Louisiana.

Status: Has temporary FPC approval.

Project: 352 miles of 30-in. loop between Louisiana and Leach, Ky.; 54 miles of 24-in lateral in Louisiana.

Status: Under way.

Contractor: **Houston Contracting Co.** has 216 miles of the 30-in. with two spreads working: 110 miles beginning near Inverness, Miss., A. J. Slovack, supt., office at Greenwood, Miss.; 106 miles beginning near Jena La., L. A. Young, supt., office at Jena. **H. C. Price Co.** has 132 miles in Kentucky and Tennessee, R. L. Ezell, supt., office at Stanford, Ky.; C. R. Ice, supt., office at Tompkinsville, Ky.

Completion: November 1, 1958.

• **Houston Texas Gas & Oil Corp.**

Project: 702 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 139 miles of 18-in. and 101 miles of 20-in. from Kissimmee to Cutler, Fla.; 642 miles of 3 to 18-in. sales laterals in Florida. Main line to join Coastal Transmission's line from McAllen, Tex., to Baton Rouge.

Status: Right-of-way procurement under way.

Contractor: **Midwestern Constructors** has the 702 miles of 24-in.; **Hurbert Construction Corp.** has remainder.

Completion: 1959.

• **Humble Oil & Refining Co.**

Project: 250 miles of 26 or 30-in. from Southwest Texas area to Houston, plus 200 miles of various size gathering lines.

Status: Planned.

Completion: 1960.

Project: 67 miles of 30-in. between Clear Lake and Lovell Lake junction, Tex., and 24-in. from there on to Port Arthur.

Status: Under way.

Contractor: **Sharman, Allen, Gay & Taylor** have 39 miles from Hankamer to Port Arthur, to complete July 1, 1958. **Panama-Williams Corp.** has 39 miles from Clear Lake to Hankamer. **Gulf Welding & Machine Works,** Conroe, Tex., has the Houston Ship Channel crossing.

• **Iron Ranges Natural Gas Co.**

Project: 70 miles of 6 to 16-in. in Mesabi Iron Range area.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 63 miles of 12-in. between Duluth and Silver Bay, Minn.

Status: Pending FPC approval.

Completion: November 1, 1958.

• **Lone Star Gas Co.**

Project: 18 miles of 6-in. loop in Hamilton County, Texas.

Status: Planned.

Contractor: Company forces.

Completion: July 1, 1958.

Project: 11 miles of 16-in. relocation of line around Abilene, Tex.

Status: Planned.

Contractor: Company forces.

Completion: August 1, 1958.

Project: 22 miles of 20-in. loop in Henderson and Navarro counties, Texas.

Status: Planned.

Contractor: Company forces.

Completion: October 1, 1958.

• **Manufacturers Light and Heat Co.**

Project: 6 miles of 26-in. from Hickory to Primrose, Pa.

Status: Pending FPC approval.

Completion: July 1958.

Project: 5 miles of 12-in. from Empire to Toronto, Ohio.

Status: Plan to file for FPC approval.

Completion: September 1958.

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PIPELINE CONSTRUCTION

Project: 9 miles of 8-in. from Stuebenville to Wintersville, Ohio.
Status: Planned.
Completion: December 1958.
Project: 9 miles of 8-in. from Berlin to Somerset, Pa.
Status: Planned.
Completion: January 1959.

• **Michigan Consolidated Gas Co.**
Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.:** Floyd Huduall, supt., office at Cadillac.
Project: 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.,** jointly with **H. L. Gentry Construction,** Frank Morris, superintendent, office at Hart, Mich.

• **Michigan Gas Storage Co.**
Project: 40 miles of 26-in. from storage fields in Michigan, to Consumers Power Co. distribution system.
Status: Under way.
Contractor: **Midwestern Constructers, Inc.**

• **Michigan Wisconsin Pipe Line Co.**
Project: 33 miles of 4, 6-in., 2 miles of 12-in., 4 miles of 10-in., and 7 miles of 8-in. gathering lines in LaVerne Field, Harper County, Okla.
Status: Planned. Pending FPC approval.
Completion: October 1, 1958.
Project: 56 miles of 20-in. extension of LaVerne line, Harper County, Okla.
Status: Has FPC examiner's approval.
Completion: October 1, 1958.
Project: 25 miles of 12-in. loops in Wis.
Status: Planned. Pending FPC approval.
Completion: October 1, 1958.
Project: 21 miles of 22-in. loops in Mich.
Status: Has FPC examiner's approval.
Completion: October 1, 1958.

• **Montana-Dakota Utilities Co.**
Project: 12-mile, 12-in. line parelling main line between Billings and Laurel, Mont.
Status: Planned.
Completion: Fall 1958.

• **Natural Gas Pipeline Co. of America**
Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co., and 91 miles of 30-in. loops along parts of its main line.
Status: Approved by FPC Examiner. Delayed until 1959.
Project: 337 miles of 30-in. between Fritch, Tex., and Beatrice, Neb., and 59 miles of 36-in. between Beatrice and Joilet, Ill., along existing system.
Status: Pending FPC approval.
Completion: 1959.
Project: 232 miles of 36-in. between Beatrice, Neb., and Joliet, Ill., and 258 miles of 36-in. and 21 miles of 26-in. between the Texas Panhandle and Beatrice.
Status: Pending FPC approval.

• **New York State Natural Gas Corp.**
Project: Replacing 12 miles of 20-in. with 30-in. from Newfield to Dryden, N. Y.
Status: Under way.
Contractor: **Pipeline Maintenance & Construction, Inc.,** Camp Hill, Pa.
Completion: July 15, 1958.
Project: Replacing 13 miles of 12-in. with 20-in. from Harrison to Genesee, Pa.
Status: Pending FPC approval, plans are to start in June.
Contractor: **Harford Brothers,** Emporium, Pa.
Completion: August 1, 1958.
Project: 30 miles of 20-in. from Castile to Elma, N. Y.
Status: Pending FPC approval, plans are to start July 7, 1958.
Contractor: **Joyce Pipe Line Co.,** Andover, N. Y.
Completion: October 10, 1958.
Project: 12, 6, 8-in. lines for storage project at Woodhull, N. Y.
Status: Under way.
Contractor: **Felmont Oil Corp.,** Bradford, Pa.
Completion: August 29, 1958.
Project: 12, 10, 8, 6-in. storage lines in Leidy and Stewardson Townships, Pa.
Status: Pending FPC approval, plans are to start July 7, 1958.
Contract: **Harford Brothers,** Emporium, Pa.
Completion: November 1, 1958.

• **North Carolina Natural Gas Corp.**
Project: 630 miles of 2 to 16-in. from near Mooresville, eastwardly across N. C.
Status: To start in July or August.
Completion: 1958.

• **Northern Illinois Gas Co.**
Project 140 miles of 24-in. from East Dubuque, Ill., to Des Plaines, Ill.
Status: Pending FPC approval.
Contractor: **Williams Brothers Co.** has preliminary engineering and right-of-way studies under way.
Completion: November 1, 1958.

• **Northern Natural Gas Co.**
Project: 18 miles of 20-in. from Dubuque, Iowa, to Menominee, Ill.
Status: Pending FPC approval.
Completion: November 1, 1958.
Project: 19 miles of 30-in. from South Sioux City to Oakland, Neb.
Status: Pending FPC approval.
Completion: November 1, 1958.
Project: 9 miles of 30-in. from Palmyra to Beatrice, Neb.
Status: Pending FPC approval.

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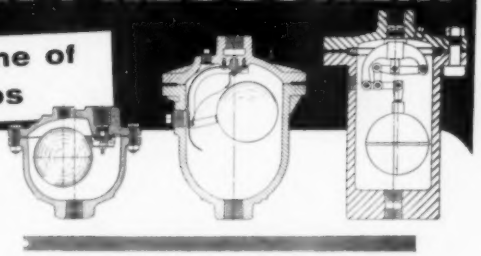

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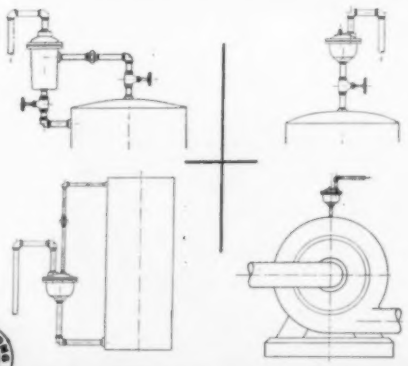

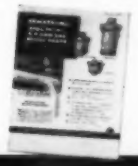

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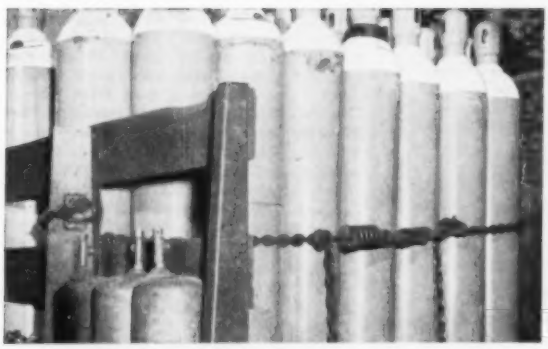

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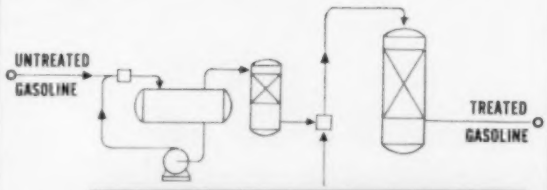

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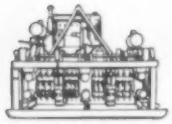
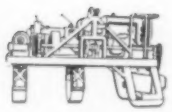
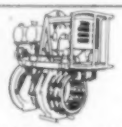

stationary cleaning & priming machine


road boring machine

Cinch hydraulic pipe bending machine

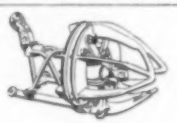
line traveling coating & wrapping machine


line traveling cleaning & priming machine

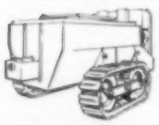
pipeline cradles

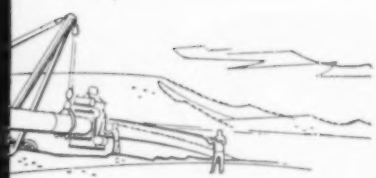
stationary coating & wrapping machine

pipe cutting & beveling machine


internal line up clamp

ditch padder


pipeline kettles



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PIPELINE CONSTRUCTION

Completion: November 1, 1958.
Project: 11 miles of 30-in. from Clifton to Tescott, Kan.
Status: Pending FPC approval.
Completion: November 1, 1958.
Project: 8 miles of 30-in. from Tescott to Bushton, Kan.
Status: Pending FPC approval.
Completion: November 1, 1958.
Project: 11 miles of 30-in. from Sunray Tex., to Beaver, Okla.
Status: Pending FPC approval.
Completion: November 1, 1958.
Project: 8 miles of 30-in. and 44 miles of 16-in. from Beaver, Okla., to Mullinville Kan.
Status: Pending FPC approval.
Completion: November 1, 1958.
Project: 169 miles of 20-in. from Farmington, Minn., to Superior, Wis.
Status: Pending FPC approval.
Project: 23 miles of 24-in. main line loops in Nebraska.
Status: Pending FPC approval.
Project: 43 miles of 20-in. main line loops in Kansas, Nebraska, and Iowa.
Status: Pending FPC approval.
Project: 44 miles of 16-in. in Duluth-Superior area.
Status: Pending FPC approval.
Project: 1,100 miles of 26-in. from Montana border to Minneapolis, Minn. (See Northern Natural Gas Co. in Canadian Natural Gas Pipeline section).
Status: Planned.
Project: 1,090 miles of 2 to 16-in. branch lines in Minnesota, Iowa, South Dakota, Nebraska, and Wisconsin.
Status: Pending FPC approval.
Project: 57 miles of 30-in. main line loops in Nebraska and Kansas.
Status: Pending FPC approval.

- **Northern Utilities Co.**
  Project: 35 miles of 16-in. in Fremont Natrona County, Wyoming, area; 8 miles of 12-in. around Casper; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander area.
  Status: Planned.
- **Offshore Gathering Corp.**
  Project: 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. (Dual line.)
  Status: Application pending with FPC.
- **Ohio Fuel Gas Co.**
  Project: 15 miles of 12-in. from Line H, Crawford Station to Zanesville, Ohio.
  Status: Planned.
  Completion: September 1, 1958.
  Project: 3 miles of 20-in. from Line D-357 to near Marion, Ohio.
  Status: Planned.
  Completion: August 30, 1958.
  Project: 2 miles of 12-in. from Line Z to near Troy, Ohio.
  Status: Planned.
  Completion: September 15, 1958.
  Project: 10 miles of 8-in. from Line O-1463 to near St. Clarisville, Ohio.
  Status: Planned.
  Completion: October 5, 1958.
  Project: 4 miles of 20-in. from Line A-97 to near Dayton, Ohio.
  Status: Planned.
  Completiton: October 2, 1958.
  Project: 13 miles of 4 to 20-in. from Medina storage to near Medina, Ohio.
  Status: Planned. Filed application January 16, 1958.
  Completion: July 25, 1958.
  Project: 15 miles of 12-in. from Line L-400 at Shreve, Ohio, to Minerva, Ohio.

PIPELINE CONSTRUCTION

Status: Planned.
Completion: August 5, 1958.
Project: 4 miles of 8-in. from Line Z-207 to near Bellefontaine, Ohio.
Status: Planned.
Completion: July 20, 1958.
Project: 4 miles of 20-in. from Line L-2542 to near Oberlin, Ohio.
Status: Planned.
Completion: August 12, 1958.

• **Oklahoma Missouri Gas Transmission Co.,** Liberty Bank Building, Oklahoma City.
Project: 500 miles of 24-in. from Central Oklahoma to St. Louis.
Status: Proposed.

• **Pacific Gas & Electric Co.**
Project: 160 miles of 12-in. from Corning to Eureka, Calif.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co. and Alex Robertson Co.**
Completion: July 1958.
Project: 7 miles of 8-in. from Eureka to Arcata, Calif.
Status: Planned.
Contractor: Company personnel.
Completion: December 1958.

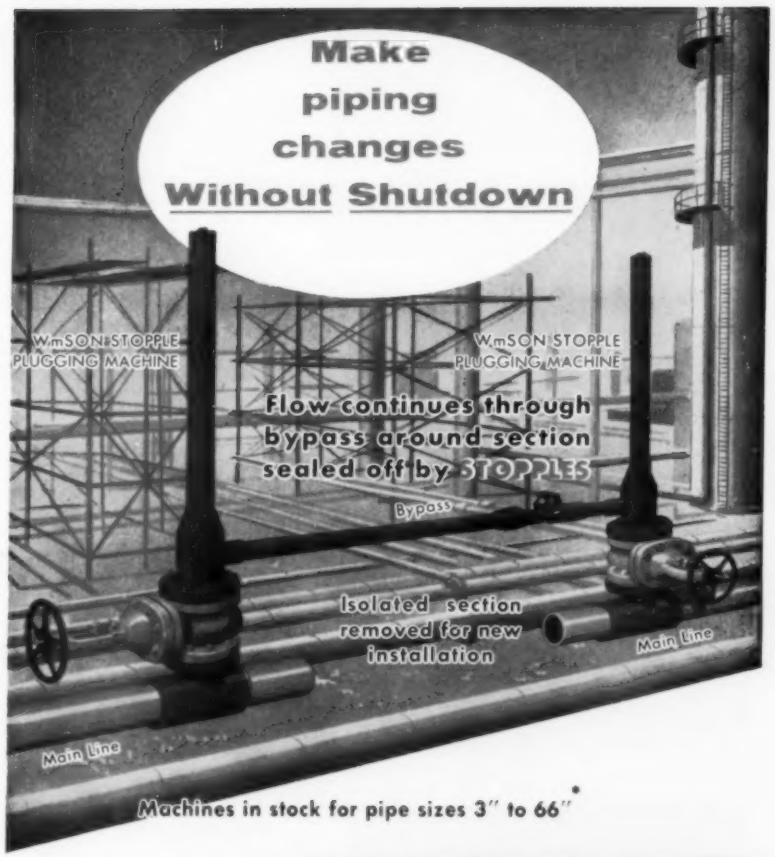
• **Pacific Lighting Gas Supply Co.**
Project: 83 miles of 34-in. from North Coles Levee to Newhall, Calif.
Status: Under way.
Contractor: **Engineers Limited Pipeline Co.**
Completion: July 1, 1958
Project: 128 miles of 34-in. from Topock to Newberry, Calif.
Status: Filed April 1958, for California Public Utilities Commission approval.
Completion: November 1, 1959.

• **Pacific Northwest Pipeline Corp.**
Project: 40-mile line from Ute Trail gas fields in northeastern Utah to its main line in western Colorado.
Status: Planned to start spring 1958
Project: 51 miles of 30-in. from main line to Big Piney field, Wyoming, looping present 16-in. lateral.
Status: Pending FPC approval.

• **Panhandle Eastern Pipe Line Co.**
Project: 95 miles of 4-in., 45 miles of 6-in., 38 miles of 8-in., 3 miles of 10-in., and 12 miles of 12-in. gathering lines in Kansas, Oklahoma, and Texas.
Status: Under way.
Contractor: **Hall Construction Co.**
Completion: December 31, 1958.
Project: 33 miles of 16-in. from Muncie, Ind., to Hollansburg, Ohio.
Status: Under way.
Contractor: **O. R. Burden Construction Corp.**
Completion: September 1, 1958.

• **Pennsylvania Gas Co.**
Project: 23 miles of 10-in. in Erie County, Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa., 30 miles of branch lines, several small distribution lines.
Status: Has FPC permit.

• **Peoples Natural Gas Co.**
Project: 20 miles of 20-in. from Derry to Morrellville, Pa.
Status: Planned.
Completion: August 1958.
Project: 8 miles of 10-in. from Altoona to Tyrone, Pa.
Status: Under way.
Contractor: **Reese Construction Co.**
Completion: August 1958.
Project: 4 miles of 12-in. from Elders Ridge to Clarksburg, Pa.
Status: Planned.
Completion: July 1958.
Project: 6 miles of 12-in. from Leechburg to New Kinsington, Pa.
Status: Planned.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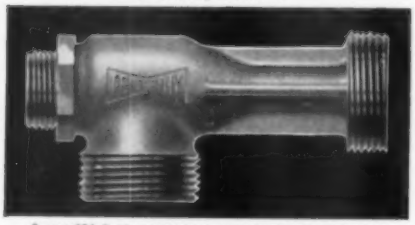

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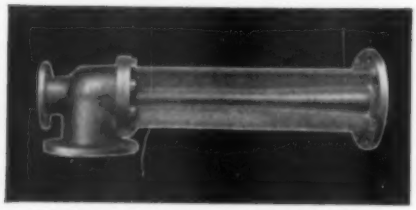

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PIPELINE CONSTRUCTION

Completion: July 1958.
Project: 7 miles of 12-in. from Gibsonia to Mars, Pa.
Status: Under way.
Contractor: **Reason Construction Co.**
Completion: July 1958.
Project: 3 miles of 12-in. from Elizabeth to Webster Pool, Pa.
Status: Planned.
Completion: August 1958.
Project: 17 miles of 10-in. from Laurel Ridge, Pa., south.
Status: Planned.
Completion: August 1958.
Project: 17 miles of 24-in. from McKeesport, Pa., south.
Status: Planned.
Completion: September 1958.

• **Phillips Petroleum Co.**
Project: 25 miles of 6 through 20-in. in South Eunice, N. M., area.
Status: Planned.
Project: 52 miles of 4 through 20-in. in Gaines County, Texas.
Status: Under way.
Contractor: **Vaughn & Taylor Construction Co., Inc.**
Completion: August 1.
Project: 10 miles of 3 through 20-in. in Hutchinson County, Texas.
Status: Under way.
Contractor: **H. A. McGinnis.**
Completion: December 31, 1958.

• **Piedmont Gas Co.**
Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Carolina to serve Gaston, Lincoln, Catawba, Caldwell and Burke counties.
Status: Has FPC approval.

• **Pioneer Gathering System, Inc.**
Project: Gathering lines at Texas fields: 7 miles of 4-in. in Buckhorn field; 2 miles of 6-in., 1 mile of 4-in., and 2 miles of 8-in. in Vinegarone field; 2 miles of 3-in. in Mt. Ketchum field; 4 miles of 3-in., 1 mile of 2-in., and 16 miles of 4-in. in Tilleny field; 7 miles of 2-in. in Mertyon field.
Status: Plans to file for FPC permit.
Completion: November 1, 1958.

• **Roanoke Gas Co.**
Project: 18 miles of 12-in. from Trinity to Gala, Va.
Status: Under way.
Contractor, **Construction Service Co.** of Bound Brook, N. J., Victor Nelson and W. E. Colligan, supts.
Completion: August 1, 1958.

• **Signal Oil & Gas Co.**
Project: Considering expansion of gathering system for its sulfur-extraction plant at Tioga, N. D., into the developing oil area near the Canadian border in Burke County.
Status: Decision expected spring 1958.

• **Southern California Gas Co.** and **Southern Counties Gas Co.**
Project: 18 miles of 30-in. from near Newhall, Calif. to Burbank Boulevard and Yarmouth Avenue in Los Angeles.
Status: Planned.
Completion: December 1958.

• **Southern Natural Gas Co.**
Project: Supply lines in South Louisiana: 4 miles of 16-in. Bayou Long field lateral; 7 miles of 16-in. Little Bayou Pigeon lateral; 4 miles of 6-in. Mystic Bayou field lateral; 2 miles of 6-in. East Bayou Pigeon lateral.
Status: Approved.
Project: 7 miles of 24-in. from Gwinville to Pickens, Miss.
Status: Approved.
Project: 13 miles of 10-in. Tanting field lateral in South Louisiana.
Status: Planned. Pending FPC approval.
Project: 3 miles of 8-in. Dexter field lateral in Mississippi.

PIPELINE CONSTRUCTION

Status: Planned. Pending FPC approval.

Project: Supply lines in South Louisiana: 46 miles of 20-in. from White Castle to South Section 28 field; 7 miles of 10-in. Bayou Boullion field lateral; 11 miles of 8-in. East Happytown field lateral; 8 miles of 10-in. and 11 miles of 8-in. Loisel field lateral; 17 miles of 20-in. Lake Washington field lateral; 22 miles of 12-in. West Delta Block 30 lateral; 4 miles of 8-in. Bayou Long field lateral; 6 miles of 4-in. Bayou Villars field lateral; 12 miles of 6-in. Marrero field lateral; 6 miles of 6-in. South Lake Long field lateral; 1 mile of 4-in. Tigers Ridge field lateral; 35 miles of 16-in. Montegut field lateral; 13 miles of 16-in. Barataria Line loop; 69 miles of 24-in. from Toca to Franklinton.

Status: Approved.

Project: 67 miles of 24-in. from Gwinville to Enterprise, Miss.; 71 miles of 24-in. from Enterprise to Gallion, Ala.; 83 miles of 24-in. from Gallion to Elmore, Ala.; 43 miles of 20-in. and 46 miles of 24-in. from Elmore to Ellerslie, Ga.; 69 miles of 20-in. from Ellerslie to Ocmulgee, Ga.; 79 miles of 16-in. from Ocmulgee to Wrans, Ga.; 8 miles of 6-in. Vicksburg, Miss., loop line; 5 miles of 12-in. Amory, Miss., loop line; 9 miles of 8-in. Calera, Ark., loop line; 23 miles of 14-in. Rome, Ga., loop line; 9 miles of 8-in. at LaGrange, Ga.; 62 miles of 14-in. from Ocmulgee, Ga. to Atlanta, Ga.

Status: Planned. Pending FPC approval.

Project: Facilities to attach additional gas supplies in South Louisiana: 6 miles of 8-in. from Ship Shoals Block 28 to Block 32; 29 miles of 16-in. from Ship Shoals Block 28 to Atchafalaya Bay; 15 miles of 16-in. from north shore Atchafalaya Bay to Patterson; 6 miles of 16-in. from Patterson to Duck Lake; 8 miles of 6-in. Bayou Felice lateral; 1 mile of 4-in. Triumph field lateral; 2 miles of 8-in. Coffee Bay field lateral.

Status: Planned for 1958-1959.

Project: Facilities to attach additional gas supplies in Mississippi: 8 miles of 8-in. Hub field lateral; 40 miles of 14-in. and 40 miles of 16-in. from Cranfield to Gwinville.

Status: Planned for 1958-1959.

Project: Gathering system loops in Louisiana: 42 miles of 20-in. from White Castle to Franklinton; 17 miles of 20-in. from Olga to Toca.

Status: Planned for 1958-1959.

- **Tennessee Gas Transmission Co.**

Project: 556 miles of 30-in. from Mississippi Delta area south of New Orleans to Portland, Tenn.

Status: Has FPC approval.

Project: 76 miles of 24-in. from Couders port, Pa., to Hamburg, N. Y.

Status: Has FPC approval.

Contractor: **Williams Bros. Co.**

Project: 163 miles of 30-in. and 101 miles of 26-in. from Portland, Tenn., to near Lancaster, Ky.; from Winchester, Ky., to Morehead, Ky.; from Catlettsburg, Ky., toward Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from Morehead, Ky., to Catlettsburg, Ky.

Status: Has Temporary FPC approval.

- **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney Field, Miss., westerly to connect with Olin Gas Transmission Co.'s line in Tensas Parish, Louisiana.

Status: Approval April 1958.

- **Texas Eastern Penn-Jersey Transmission Corp.**

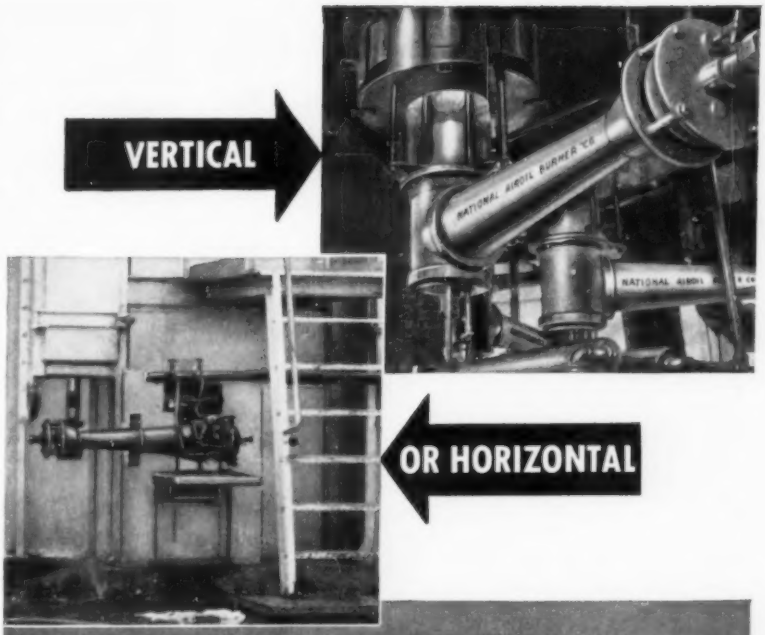
Project: 12 miles of 30-in. looping in Pa.

Status: Approved.

Contractor: **H. C. Price Co.**

- **Texas Eastern Transmission Corp.**

Project: 17 miles of 8-in. and 3 miles of



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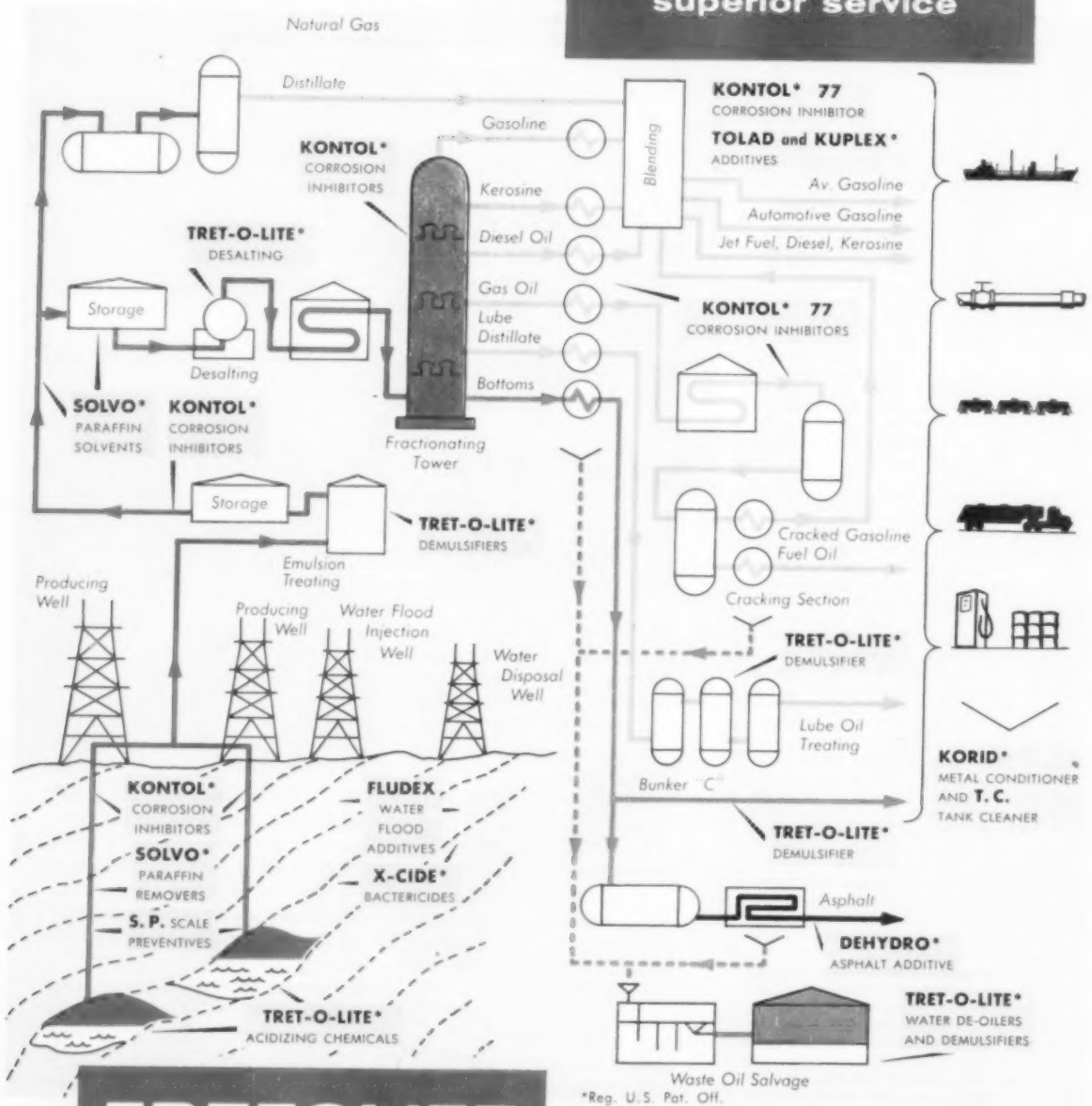

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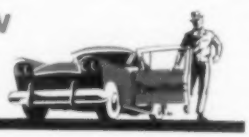

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PIPELINE CONSTRUCTION

6-in. from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas.

Status: Has FPC approval.

Project: 22 miles of 14-in. from Rayne field to near Opelousas, La.

Status: Has FPC Examiner's approval.

Completion: November 1958.

Project: 47 miles of 30-in. looping in Kentucky and Ohio.

Status: Under way.

Contractor: **H. C. Price Co.**, G. A. Reutzel, supt., office at Caldwell, Ohio; W. H. Olrich, supt., office at Danville, Ky., to later move to Portsmouth, Ohio.

- **Texas Illinois Natural Gas Pipeline Co.**

Project: 860 miles of 30-in. looping of present system.

Status: Planned.

Completion: 1960-1961.

- **Transcontinental Gas Pipe Line Corp.**

Project: 202 miles of 36-in. and 13 miles of 30-in. main line loop; 150 miles of 23-in. and 24 miles of 24-in. from Leidy storage field in Pa., to its trunk line to N.Y., 202 miles of 10 to 20-in. gathering lines in southeast La.; 48 miles of 10 to 20-in. to tap gas off Tex.

Status: Pending FPC approval.

Contractor: **Sharman, Allen, Gay & Taylor** has 65 miles and **Panama-Williams Corp.** has 109 miles of the line from Leidy storage field in Pennsylvania, to trunk line to New York.

Project: 57 miles of 36-in. main line loop.

Status: Pending FPC approval. Planned for 1959.

Project: 87 miles of 24-in. laterals, plus small gathering lines connecting seven Louisiana fields with the New Orleans area.

Status: Pending FPC approval.

- **Transwestern Pipe Line Co.** (Warren Petroleum, Monterey Oil Co.; J. R. Butler).

Project: 635 miles of 24-in. from Perryton and Fort Stockton, Tex., to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz.

Status: Pending FPC approval.

Completion: Mid-1959.

- **Trunkline Gas Co.**

Project: 24, 26-in. Red River crossing in Rapides Parish, Louisiana.

Status: Filed for FPC approval April 1958.

Contractor: **Missouri Valley Dredging Co.**

Completion: January 1959.

- **United Gas Corp.**

Project: 17 miles of 12-in. and 1 mile of 6, 8-in. from Lirette-Mobile line in Jackson County, south to Bayou Casottee industrial area east of Pascagoula, Miss.

Status: Under way.

Contractor: **Houston Contracting Co.**, L. A. Young, supt., office at Moss Point, Miss.

Project: 117 miles of 30-in. loop from southeast Louisiana, to Mobile, Ala.

Status: Approved.

Project: 12 miles of 16-in. and 16 miles of 8-in. on Gulf Coast of Louisiana, in Terrebone Parish.

Status: Under way.

Contractor: **Brown & Root, Inc.**

Project: 3 miles of 8-in. from Lake Hatch field to Lirette-Napoleonville line in Terrebonne Parish, Louisiana.

Status: Planned. Approved.

Project: 4 miles of 6-in. from Southeast Houma field to North Houma field line in Terrebonne Parish, Louisiana.

Status: Planned. Approved.

Project: 3 miles of 6-in. from Lake Fields field to Lake Long-St. Rose line in Terrebonne Parish, Louisiana.

Status: Under way.

Contractor: **J. Ray McDermott & Co., Inc.**, of New Orleans.

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HIGH INPUT RATE — 18,000 counts per hour (max.).

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TRUE DIGITAL Pulse Code type of transmission.

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SYSTEM AND EQUIPMENT not limited to telemetering of single type of measurement — transmitters/convertors available for liquid level, temperature, pressure, etc. System arrangements available as accessory features for remote control functions, data logging and alarm signals.

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PIPELINE CONSTRUCTION

Project: 4 miles of 12-in. from Fairbanks-Rosslyn-North Houston field facilities to near Houston.
Status: Planned.
Project: 5 miles of 20-in. from Refugio-Houston line to Smither Lake.
Status: Under way.
Contractor: **Fowler-Tatom** of Cotton Valley, La.

• **Western Slope Gas Co.**
Project: 7 miles of 4-in. gathering lateral in northwestern Colorado.
Status: Planned.
Completion: July 1, 1958.

Canadian Crude-Oil Pipelines

• **Act Oils, Ltd.**
Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Kitimat, B. C.
Status: Request has been made for permit from the B. C. government.

• **B-A Alberta Pipe Line, Ltd.**
Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.
Status: Pending approval.

• **Bituminous Oil Pipeline Co.** (Royalite Oil Co. and Can-Amera Oilsands Development, Ltd.)
Project: 250-mile line from Athabasca oil sands in northeastern Alta., to Edmonton.
Status: Long-range plans.
Completion: 1960.

• **East Coast Transmission Co.** (Pacific Petroleums, Ltd., Home Oil, Ltd., Canadian Homestead Oil, Ltd., Merrill Petroleums, Ltd.)
Project: Line from Alberta to Montreal.
Status: Proposed.

• **Federated Pipe Lines, Ltd.,** Calgary (subsidiary of Home Oil Co., Ltd.).
Project: 130 miles of 10-in. from Swan Hills area to Edmonton, Alta.
Status: Under way.

• **Interprovincial Pipe Line Co.**
Project: 82 miles of 24-in. loops in Alta. and Sask.
Status: Under way.
Contractor: **Piggott Construction, Ltd.,** Edmonton, Alta.
Completion: September 1958.

• **Mid-Continent Pipe Lines, Ltd.**
Project: 1,500-mile, 30-in. line from Edmonton to Chicago via Alberta, Saskatchewan, North Dakota, Minnesota, Wisconsin, and Illinois; U.S. section to be owned by International Oil Pipeline Corp.
Status: Permit sought from Canadian Board of Transport Commissioners; W. C. Gilman & Co., New York, has made preliminary study.

• **Peace River Oil Pipe Line Co., Ltd.**
Project: 70-mile line including 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek pump station to Windfall, Virginia Hills, and Swan Hills fields, Alberta.
Status: Pending approval of Alberta Government.

• **Producers Pipelines, Ltd.**
Project: 50 miles of 4, 6-in. gathering line extensions in fields in southeast Sask.
Status: Under way.
Contractor: **Majestic Contractors, Ltd.,** Jeff Minter, supt., office at Estevan.
Completion: October 30, 1956.

• **Westcoast Transmission Co., Ltd.**
Project: Line to parallel its 650-mile, 30-in. gas line from Peace River to Vancouver, B. C.
Status: Under study.

Canadian Products Pipelines

• **Hydrocarbons Pipeline Co.**
Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.
Status: Has permit from Parliament of Canada. Seeking approval by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.
Construction consultants: **Dutton-Williams Brothers, Ltd.,** and **A. D. Little Co.**

Canadian Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co., Ltd.**
Project: 145 miles of 24-in. from Pincher Creek to Princess, Alta., including 11 major canal crossings.
Status: Under way.
Contractor: **Piggott Construction, Ltd.,** Calgary.
Completion: September 1, 1958.
Project: 11 miles of 6-in. at Sibbald field and 5 miles of 6-in. at Atlee Buffalo, Alta.
Status: Planned.
Completion: September 1, 1958.

• **Alberta & Southern Transmission Co., Ltd.**
Project: 1,300 miles of 36-in. from Alberta to San Francisco area plus 47 miles of gathering lines.
Status: Planned
Completion: 1960.

• **British American Oil Co., Ltd.**
Project: 20 miles of 2 to 14-in. wet gas condensate gathering system in Pincher Creek, Alta., area.
Contractor: **Mannix Co., Ltd.,** R. L. Tulford, supt.

• **Canadian Western Natural Gas Co., Ltd.**
Project: 58 miles of 16-in. from Carbon field to Calgary, Alta.
Status: Proposed. Pending approval of Alberta Oil and Gas Conservation Board.

• **Northern Natural Gas Co.**
Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.

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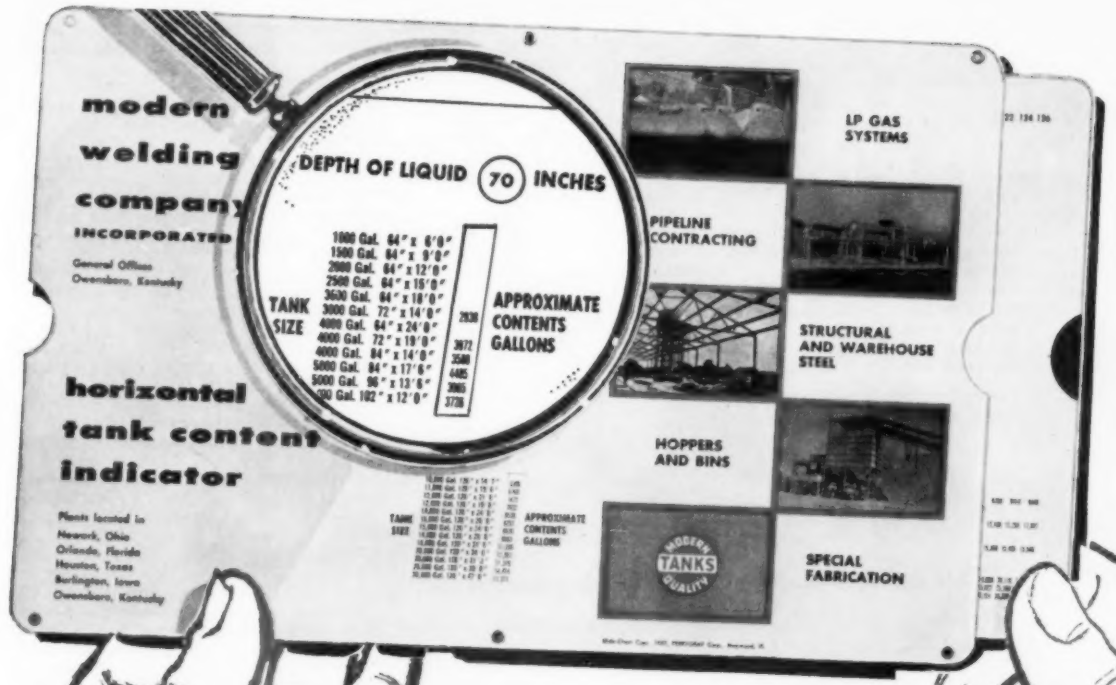

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PIPELINE CONSTRUCTION

Status: Planned.

Project: 32 miles of 24-in. from Pincher Creek, Alta., to Montana border to tie in with planned U. S. line on to Minneapolis, Minn.

Status: Planned.

• **Northern Ontario Natural Gas Co., Ltd.**

Project: 90 miles of 10-in. from North Bay to Sudbury, Ont.

Status: Under way.

Contractor. **Mannix, Ltd.,** V. D. Worcester, supt., office at Verner.

Completion: Late fall 1958.

• **Northern Ontario Pipe Line Crown Corp.**

Project: 675 miles of 30-in. from the Ontario-Manitoba border to near Kapuskasing, Ont. (part of the 2,250-mile Trans-Canada line; will be leased to Trans-Canada Pipe Line Co. with option to buy). 360 miles from Port Arthur to Kapuskasing remains to be laid in 1958.

Status: Under way.

Contractor: **Nelen, Ltd.; Majestic Contractors, Ltd.; B. C. River Construction, Ltd.,** has 91 miles from Longlac to Hearst, E. L. Maggard, supt., office at Longlac, to complete October 1; **Mannix, Ltd.,** has 92 miles from 35 miles west of Hearst, Ont., to Kapuskasing, Odis Hare, supt., office at Hearst; **Morrison Shivers, Ltd.**

Completion: November 1958.

• **Northwestern Utilities, Ltd.**

Project: 4 miles of 16-in., 4 miles of 12-in., 4 miles of 10-in., 5 miles of 8-in., 29 miles of 6-in., and 3 miles of 4-in. Pembina field gathering system, including an 8-in. crossing of Pembina River, and a 16-in. crossing of North Saskatchewan River.

Status: Under way.

Contractor: **Mannix Co., Ltd.,** S. Steffen, supt., office at Drayton Valley.

Completion: September 30, 1958.

Project: 45 miles of 16-in. from Pembina field to tie in with existing 26-mile, 16-in. oil line terminating at Edmonton, Alta., which Northwestern is buying from Pembina Pipeline, Ltd., and which will be converted to gas.

Status: Under way.

Contractor: **Mannix Co., Ltd.**

Completion: September 30, 1958.

• **Saskatchewan Power Corp.**

Project: 5 miles of 16-in., 18 miles of 10-in., 4 miles of 8-in., 13 miles of 4-in., and 13 miles of 3-in. Many Islands gathering system in Alta.; 6 miles of 8-in., 4 miles of 6-in., 3 miles of 4-in., and 13 miles of 3-in. Hatton gathering system in Sask.; 38 miles of 12-in. extension of Steelman-Regina line; 124 miles of 10-in. extension of Regina-Moose Jaw line; 90 miles of 14-in. from Hatton to the Success-Moose Jaw line.

Status: Planned.

Contractor: **Banister Helm, Ltd.,** has the Steelman-Regina-Moose Jaw lines, Ole Johanson, supt. **Swift Current Construction Co.** and **Engelking & James, Ltd.,** have the Many Islands gathering lines. **Robb Construction, Ltd.,** has the Hatton gathering lines. **Engelking & James, Ltd.,** has the Hatton to Success-Moose Jaw line.

Completion: September 30, 1958.

• **Trans-Canada Pipe Lines, Ltd.**

Project: 491 miles of 30-in. from Kapuskasing to Toronto.

Contractors: Starting at Kapuskasing and going toward Toronto, **Grayco Contractors, Inc.,** has 82 miles; **Majestic Contractors, Ltd.,** has 83 miles; **Dutton-Williams Brothers, Ltd.,** has 57 miles; **Canadian Bechtel, Ltd.,** has 47 miles from Rib Lake to Tilden Lake, H. F. (Hank) Mogg, general supt., office at Timagami; **Morrison-Shivers, Ltd.,** has 62 miles; **H. C. Price Co.** and **Poole Construction Co.** has 63 miles; **Oklahoma Pipe Line Constructors** has 92 miles.

Completion: October 1, 1958.

• **Van Tor Oils & Exploration Co.,** Vancouver.

Project: Line from B. C. mainland to Vancouver Island.

Status: Proposed.

Completion: 1960.

• **Westcoast Transmission Co., Ltd.**

Project: 110 miles of 30-in. and 176 miles of 20-in. from East Calgary and Savanna Creek fields to Kingsgate on B.C.-Idaho border.

Status: Planned.

Completion: November 1, 1958.

Project: Looping of present system to double capacity.

Status: Planned.

Project: 80 miles of 8, 10, 12, 18, 20-in. extension of gathering system along Alaska Highway in Northeastern B. C.

Status: Under way.

Contractor: **Dutton-Williams Brothers, Ltd.,** Doyle Cook, asst. supt., office at Dawson Creek.

Completion: August 1958.

Foreign Crude-Oil Pipelines

• **Arabian American Oil Co.**

Project: 9 miles of 32-in. loop from Abqaiq toward Shedgum.

Status: Planned.

Completion: 1960.

Project: 17 miles of 32-in. extension of loop from Abqaiq toward Shedgum.

Status: Planned.

Completion: 1961.

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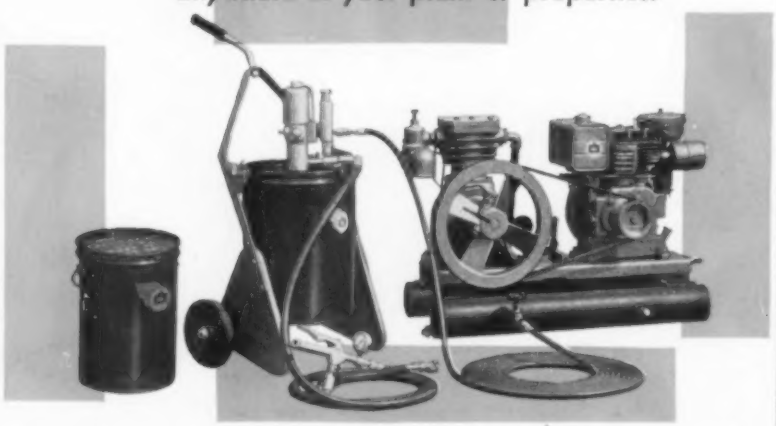

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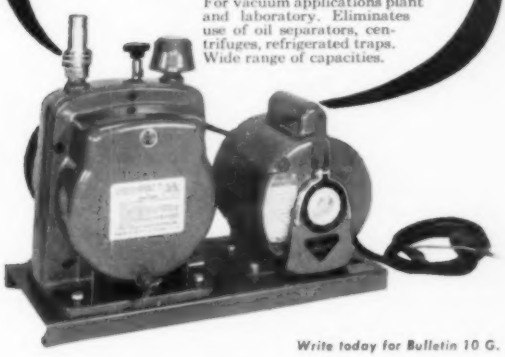

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PIPELINE CONSTRUCTION

Project: 9 miles of 30-in. extension of loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1960.
Project: 12 miles of 30-in. extension of loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1961.
Project: 54 miles of 30-in. loop of Safaniya-Ras Tanura line.
Status: Planned.
Project: 63 miles of 30 and 32-in. from Khursaniyah to Ras Tanura.
Status: Planned.

• **Assam Oil Co.**
Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.
Status: Survey of possible routes under way.
Contractor: **Pipe Line Engineering Co.** is making survey.

• **Bolivia-Paraguay.**
Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.
Status: Planned .
Contractor: **Five Lilles,** a French Combine.

• **Burmah Oil Co., Ltd.**
Project: 250 miles of 20-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.
Status: Survey under way.
Contractor: **Collins Construction Co.** is surveying locations for some 40 river crossings.

• **Caltex**
Project: 30 miles of 30-in. from Duri field in Sumatra to Dumai where a deepwater terminal will be built. Line will be extended 35 miles to Minas field later.
Status: Under way.
Contractor: **Bechtel Corp.**
Completion: 1958.

• **Cia. Shell de Venezuela**
Project: 70 miles of 30 and 34-in. heated line from Bachaquero to Puerto Miranda, and an unheated 31-in. parallel to the section from Cabimas to Puerto Miranda.
Status: Under way.
Contractor: **Williams Brothers Sudamericana, Ltd.**

• **Colombian Petroleum Co.**
Project: 42 miles of 6-in. from Tibu field to Rio de Oro in Colombia.
Status: Under way.

• **C.R.E.P.S., Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN Repal), and Cie. Francaise des Petroles Algerie**
Project: 450 miles of 16-in. from Edjele field in southeastern Algeria to a Mediterranean port on the Libyan coast.

• **Elburz Oil Corp.**
Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.
Status: Planned.

• **Iranian Oil Participants, Ltd.**
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.
Status: Planned.
Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.
Status: Planned.
Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Brothers Co.** of Tulsa; **Richard Costain, Ltd.,** and **John Brown, Ltd.,** of Britain; **Werkspoor & Bredoro** of The Netherlands.

• **Iraq Petroleum Co.**
Project: About 600 miles of up to 40-in. from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.
Status: Proposed. Survey completed.

• **Kuwait Oil Co., Ltd.**
Project: 61 miles of 30-in. from Raudhatain area to Ahmadi.
Status: Under way.
Completion: June 1959.
Project: 14 miles of 34, 36-in. No. 5 Transit Line, including loop line.
Status: Under way.
Completiton: August 1958.
Project: 7 miles of 38, 40-in. No. 11 Gravity Line from North Ahmadi Tank Farm to North Pier.
Status: Planned.
Completion: December 1958.
Project: 7 miles of 38, 40-in. No. 12 Gravity Line.
Status: Planned.
Completion: April 1959.
Status: Proposed.

• **Middle East Pipeline**
Project: 1,500 miles of 38 and 40-in. line from Persian Gulf to Mediterranean at Iskenderun, Turkey.

• **North-West Oil Pipeline Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N.J.), and British Petroleum Co., Ltd.)
Project: 230 miles of 28-in. from refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven.
Status: Under way.
Contractor: **W. M. Lyles** in joint venture with two German steel firms.
Completion: November 1958.

• **Petroleo Brasileiro S.A. (Brazil)**
Project: 40 miles of 12-in. from Catu to Madre de Deus in Bahia.
Status: Under way.
Contractor: **Techint, Inc.**

• **Rotterdam-Rhine Pipeline Co.**
Project: 185-mile, 30-in. line from Rotterdam to Ruhr industrial area, West Germany, to supply refineries at Godorf, Wesseling, and Gelsenberg.
Status: Preliminary work under way.
Completion: 1960.

• **Royal Dutch-Shell**
Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through Eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main trunk to be 30-in.
Status: Company is considering project together with several other companies.

• **SOPEG** (Cie. Francaise de Petrole (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie)
Project: 300 miles of 24-in. from Hassi Messaoud field in the Algerian Desert to Bougie on the Mediterranean Coast.
Status: Under way.
Contractor: **Entrepose Co.** jointly with **Ste. Parisienne pour Industrie Electrique.**
Completion: 1959.

• **Union of Soviet Socialist Republic**
Project: 2,300-mile Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.

• **Yacimientos Petroliferos Fiscales (Argentina)**
Project: 932 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Planned.
Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.)
Completion: Mid-1960.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca on the coast.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

• **Yacimientos Petroliferos Fiscales Bolivianos**
Project: 174 miles of 10-in. and 44 miles of 8-in. from Sicasica, Bolivia, to Arica, Chile.
Status: Under way.
Contractor: **Williams Brothers Co.**
Completion: November 1, 1958.

Foreign Products Pipelines

• **Empresa Nacional de Petroles Government of Chile** and **Cia de Petroles de-Chile (Copec), et al.**
Project: 75 miles of 10-in. from Chile's coastal refinery at Concon to Santiago.
Status: Planned.
Completion: 1958.

• **National Iranian Oil Co.**
Project: 120 miles of 6-in. northward extension of its Abadan-Teheran system.
Status: Planned.
Contractor: **B. & M. Construction Corp.,** Oklahoma City.

• **Yacimientos Petroliferous Fiscales (Argentina).**
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Bids to be opened August 1958.

Foreign Natural-Gas Pipelines

• **Attock Oil Co.**
Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
Status: Planned.

• **Cuban Gas Transmission Co.**
Project: 650-mile pipeline from Campeche area of Mexico across Yucatan and on the ocean floor to Havana, Cuba; 150 miles would be submarine.
Status: Being studied by Ebasco Services.

• **Ferngas**
Project: 45 miles of 12-in. from Semmering to Donawitz, Austria.
Status: Planned.
Contractor: **Mannesmann,** a German steel and construction firm.
Completion: 1958.

• **Gaz de France**
Project: 550 miles of 16 to 24-in. from Lacq field, southwestern France, to Paris, plus a 10-in. terminal to Nantes and 12 to 16-in. laterals to Lyons, making a 1,000-mile system.
Status: Under way.
Contractor: French contractors.
Completion: First stage in 1958; complete system in 1960.

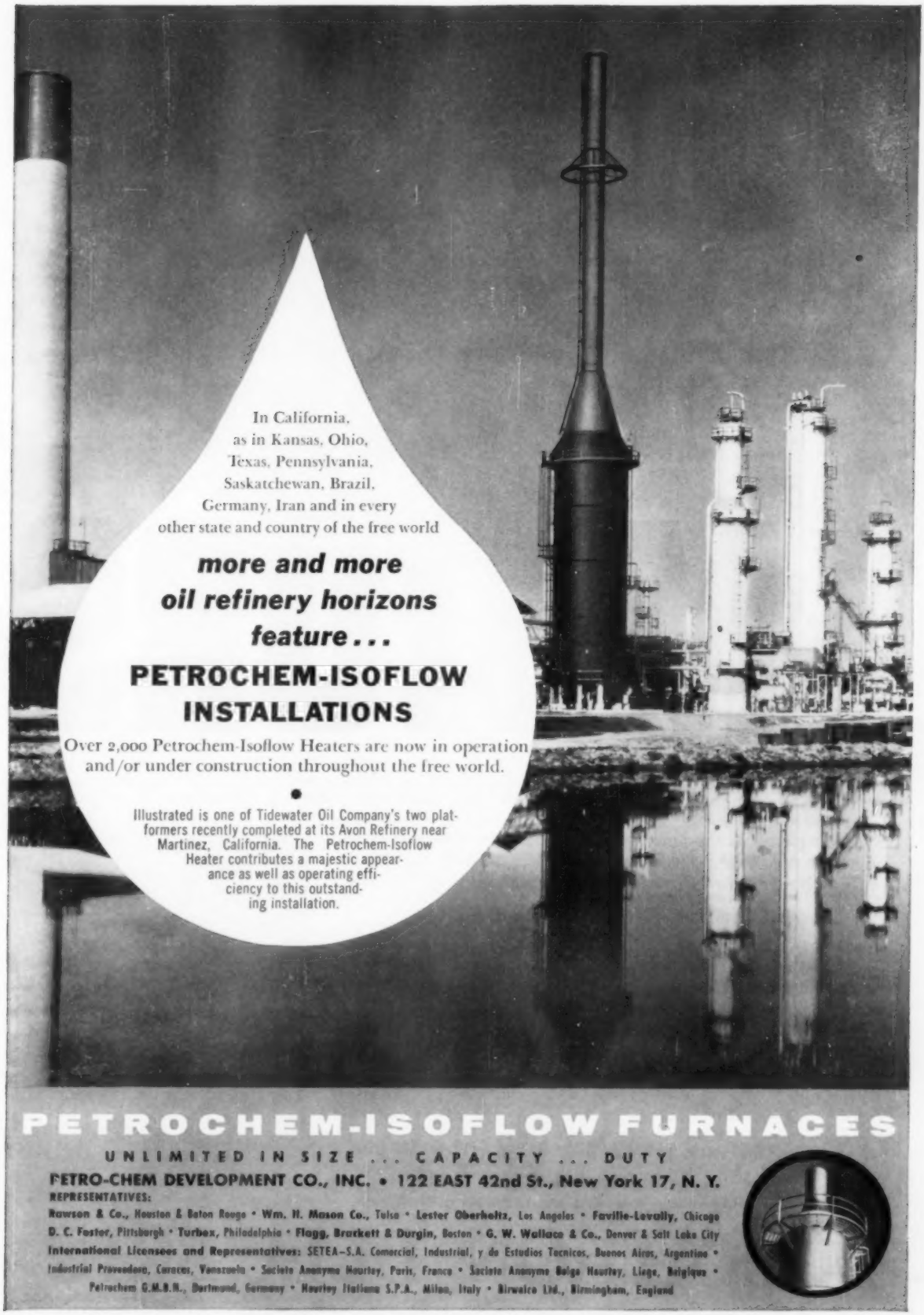
• **NIOGAS**
Project: 160 miles of 6, 8, 10, and 12-in. from Fischamend field to Vienna and other Austrian cities.
Status: Under way.
Contractor: **Williams Brothers Co. and Costain-John Brown, Ltd.**
Completion: Fall 1958.

• **Petroleos Mexicanos.**
Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.

• **Sui Gas Transmission Co.**
Project: 130-mile extension of the new 310-mile, 16-in. Moultan-to-Sui, Pakistan, line. Extension will terminate at Lyallpur.
Status: Planned.

• **Union of Soviet Socialist Republic.**
Project: 808 miles of 26-in. from Stavropol in the Northern Caucasus to Moscow, to serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.

• **Yacimientos Petroliferos Fiscales (Argentina)**
Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.
Status: To start July 1, 1958.
Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.)
Completion: Mid-1960.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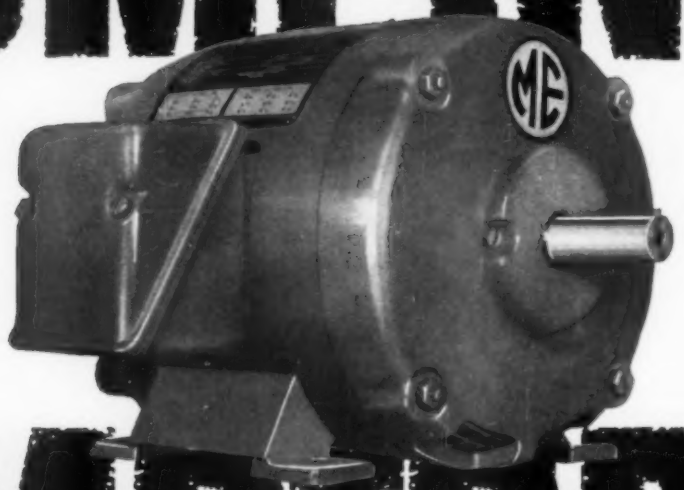

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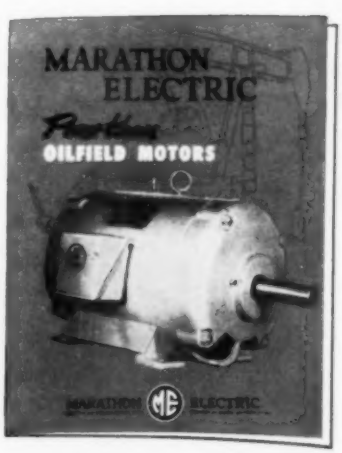

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▶ ▶ ▶ Among the Drilling Contractors

ON LOCATION in the busy Four Corners area where S. S. Reams Drilling & Well Servicing Co., of Bloomfield, N. M., is drilling for Skelly Oil Co. In the picture, left to right, are: Jim Bothim and Harold Aab, Skelly production department; Gene Reams, contractor, and three of his crewmen. The latter are: Ruebin Gee, Tom Tanner, and C. R. Veach.

Who's getting the drilling contracts

Dellson Drilling Co., Denver, is contractor for a Rio Blanco County, Colorado, wildcat. The 6,200-ft. Entrada test is Union Oil of California 1 Government, C NW NE 18-4s-101w.

Kerr-McGee Oil Industries, Inc., Oklahoma City, is contractor for a Main Pass Block 48 wildcat offshore from Plaquemines Parish, Coastal Louisiana. The well is An-Son Offshore Drilling Co. 1 State Lease 2752. Proposed depth is 10,000 ft.

Carnes Weaver Drilling Co., Houston, has contract for a 14,500-ft. well at North Fresh Water Bayou in Vermilion Parish, South Louisiana. It is the Austral Oil Exploration Co. 2 Louisiana Furs, Inc. Location is 5-16s-2e, and is the southwest offset try to Union Oil Co.'s F-1 Louisiana Furs, Inc., gas discovery.

Fatjo Drilling Co., Lafayette, has a 9,500-ft. contract for a wildcat in the West Tepetate area of Jefferson Davis Parish, South Louisiana. It is the Cheyenne Oil Co. 1 U. Fuselier, 26-7s-3w. It is ¾ mile northwest of oil production in the field.

Exeter Drilling Co., Dallas, has contract for Alco Oil & Gas Co. 1 Garrard, a wildcat in western Nebraska's portion of the Denver basin. Location of the new try is C NW NW 30-15n-55w, Kimball County. Exeter also has contract for a Morgan County, northeastern Colorado wildcat. It is the Plains Exploration Co. 1 Timpe, C NE NW 5-1n-56w, a 5,330-ft. "J" sand Dakota Cretaceous test in the Denver basin. The Dallas contractor is also busy with contract for another Morgan County wildcat, the Stuarco Oil Co. et al 1 Norwood, C SE SW 17-2n-55w. This one is a 5,030-ft. "J" sand Dakota test.

R. W. Rine Drilling Co., Wichita, has contract for a proposed 5,600-ft. wildcat in Stanton County, western Kansas. The deep test is Robert J. Beams of Dallas 1 Fred Kilgore unit, C SE SW 7-30s-42w. Location is 2 miles northwest of Sparks pool and 6 miles southwest of the town of Manter, Kans.

Parker Drilling Co., Tulsa, will drill a wildcat in northwestern Oklahoma for Pan American Petroleum Corp. The new test is located in Major County. It is the 1 Barnes, C NE SW 29-23n-15w, about 3½ miles northeast of new South Campbell field.

Montgomery Drilling Co. of Oklahoma City has contract for a Pan American Petroleum Corp. wildcat in Ellis County, northwestern Oklahoma. It is the 1 Thompson, C SE NW 21-20n-23w, northeast of Arnett.

Foree Drilling Co., Dallas, has contract for a San Juan basin wildcat in northwestern New Mexico's Rio Arriba County. The wildcat is Texota Oil Co.-Ambassador Oil Co. 1 Federal "A," S½ NW 17-26n-1e. It is a 5,500-ft. Dakota Cretaceous test.

Krueger Drilling Co. is contractor for a south offset try to Ohio Oil Co.'s recent new pay discovery at Grass Creek in Hot Springs County, Wyoming. The new well is Ohio 2 unit, SE NE NW 19-46n-98w. Ohio's discovery, the 1 pre-Tensleep unit, NE SW SW 18-46n-98w, pumped 329 bbl. of oil and 23 bbl. of water per day from perforations at 4,439-57 ft. in the Madison. There is also production from the Darwin.

Cook Drilling Co., Fort Worth, has been awarded contract for a 9,700-ft. Cotton Valley wildcat in Ouachita Parish, northern Louisiana. The well is Pan American Petroleum Corp. 1 Cage and Watkins Unit, 9-17n-3e, the second try for confirmation to West Monroe field. The discovery well in this important field, 1 Parker, 5-17n-3e, completed in February 1957, made 1,260 M.c.f. of gas and 67 bbl. of condensate per day from the Cotton Valley.

Rowan Drilling Co., Houston, has contract for a 10,300-ft. field well at North Jennings in Acadia Parish, South Louisiana. It is the Texas Pacific Coal & Oil Co. 1 Yale Tilbury in 12-9s-3w. Rowan also will be contractor on a wildcat in Lafayette Parish at Monsanto Chemical Co. 2 Girouard, 61-10s-5e, 1,500 ft. southeast of the 1 Girouard dry hole. Location is in the West Broussard area.

Loffland Bros. Drilling Co., Tulsa, will have contract for a 13,500-ft. test at Bancker in Vermilion Parish, South Louisiana, for J. Ray McDermott 2 Weill et al., 54-13s-3e.

Circle Drilling Co. has contract for a Grand Coulee field well in Acadia Parish, South Louisiana. The well is Texas Eastern and Bradco Oil & Gas Co. 1 Falcon Unit 1 in 11-8s-1w. The well will go to the Duson sand.

Loffland Brothers, Tulsa, has contract for a 11,150-ft. field well at Grand Isle Block 47, offshore from Jefferson Parish, coastal Louisiana. The well is Continental Oil Co. C-5 OCS-0133 State Lease 953.

Yates Drilling Co. has contract for a well in Branch field, Acadia Parish, South Louisiana. It is the Midwest Oil Corp. 1 L. G. Butaud, 53-8s-2e. Proposed depth is 11,000 ft.

Gorman Drilling Co. has contract for a 5,000-ft. well at South Prado (middle Loma Novia), Jim Hogg County, South Texas. The well is Gorman - Gierhart - Howe 12-B S. K. East, 17 miles south of Hebbronville.

This week's SHOWCASE features . . .

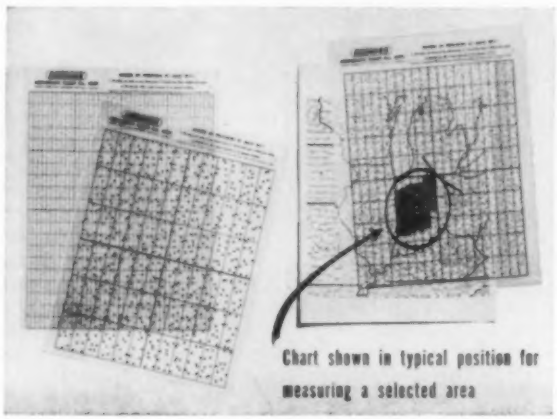

Chart shown in typical position for measuring a selected area

Fast measuring of irregular areas

. . . can be done with this new device, called an Areagraph. It performs the same basic functions as a planimeter. But it does so considerably faster and at a fraction of the cost, the maker claims.

The device provides an inexpensive method of quickly and accurately measuring irregularly shaped areas on maps, drawings, charts, photographs, and plane objects.

Areas are easily measured by placing the device (a transparent film printed with a pattern of grids and dots) over the area to be measured. Dots falling within the area to be measured are counted. The total is divided by a factor printed on the overlay. The answer is in square inches.

The Areagraph overlays are easy to use. They come in sets of three for predetermined accuracies of 85, 90, and 97 per cent.

The overlays are made of durable, polyester film. Grid lines and dots are protected by wear-resistant varnish. **Write or call: Charles Bruning Co., Inc., 1800 West Central Road, Mount Prospect, Ill., for details on Areagraph.**

Gate valve gives fire protection

. . . for plants. The special stainless-steel gate valve is spring-loaded. It acts as a safeguard against fire feeding and is designed to shut off fluid flow as temperatures build up.

The valve features a special bonnet equipped with a fusible link. It closes when the temperature around it reaches the link melting point of 160° F. When the link melts and separates, it releases springs. The resulting action shuts off the supply of combustibles through the valve into the fire area.

Also designed into the valve is a rotating double-disk assembly. It will maintain a tight seal, even if the body distorts due to heat, the maker says. With springs of stainless steel to resist atmospheric corrosion during normal plant operation, the valve is available in alloy Types 304, 316, and FA-20 and in Monel and nickel in sizes from ½ to 2 in. Operating pressure is 150 psi. **Write or call: Cooper Alloy Corp., Hillside, N. J., for details on fire-protection valve.**

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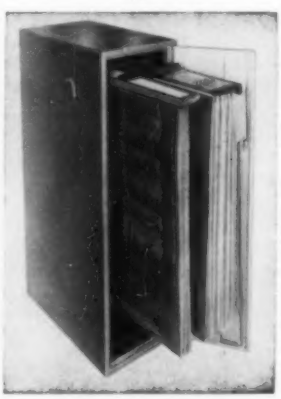

File makes drawings easy to find

. . . identify, or store. The new vertical file is designed for single large sheets such as blueprints, drawings, plans, or maps. Each sheet is filed individually. It hangs flat and free from wrinkles or creases, ready for instant identification and use.

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

.....

Described in OIL AND GAS **JOURNAL** - Issue of June 23, 1958

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

DATE.....

The new file consists of a wall-mounted bracket that accommodates up to 150 aluminum hangers. By simply attaching tubular tape to a sheet, you can easily slip a sheet on or off the hanger. This way, 150 sheets of any length can be filed in only 12 lineal inches.

The single-sheet file eliminates folding, rolling, or stacking. **Write or call: Plan Hold Corp., 5204 Chakemco Street, South Gate, Calif., for details on vertical file for single large sheets.**

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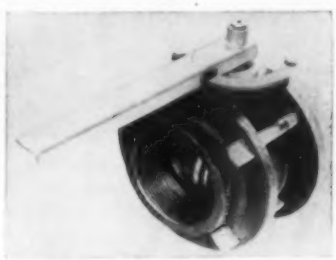

Device holds butterfly valves

. . . in position under extreme pressure at an infinite number of settings. The new automatic, irreversible control can withstand up to 1,000 lb.-in. of torque with little deflection when line-surge pressures are encountered, the maker reports. Shear pins held in shoes are used to provide locking action.

Movement can be manual, solenoid, or hydraulic actuated, or motor driven. Minute movements can be achieved where inching is desirable. This device assures positive holding without creepage—even under severe vibration conditions, according to the maker. It is designed to fail safe. **Write or call: Reid Metal Products, Inc., 2021 North Lincoln Street, Burbank, Calif., for details on new valve metering control.**

●

Hose connector for storage tanks

. . . is flexible. It prevents strain on pipelines connected to large oil-storage tanks which settle on their foundations. The connector is called Flexjoint. It bends as the tank settles, preventing strain and possible breakage in a rigid metal-piping system. It can be particularly valuable for tank farms located in marshy sections where the foundations under the tanks may settle 3 to 4 ft., the maker points out.

The hose is ruggedly built to resist weathering and fire. It is reinforced by multiple plies of high-tensile-strength fabric and helical spirals of spring-steel wire. It can be obtained in any lengths with inside diameters of 6, 8, 10, and 12 in. **Write or call: Hewitt-Robins, Inc., Stamford, Conn., for details on flexible hose connector.**

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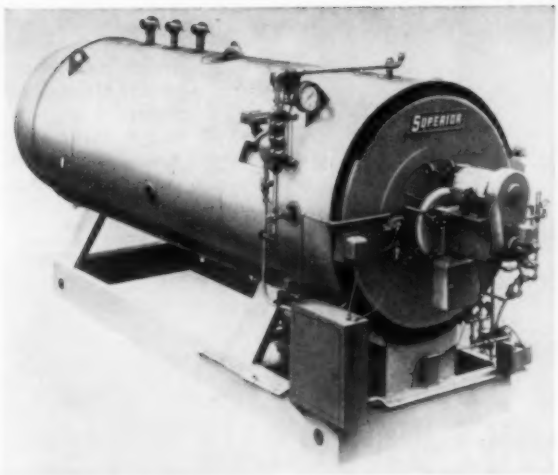

Packaged boiler quickly installed

. . . and put into operation. The Superior Compact is built in 11 sizes ranging from 20 to 200 b.hp. It's a complete package. The burner, controls, refractory, installation, and draft equipment are installed and wired at the factory. It's shipped on its own structural-steel base.

Following connections to fuel, water, steam, and electric lines, and with only a simple vent for combus- by multiple plies of high-tensile- within 24 hours after delivery.

The basic boiler is of the horizontal, four-pass, down-draft type. The unit is guaranteed to achieve a minimum of 80% thermal efficiency over its entire firing range, with stack temperatures not exceeding 125° F. above the steam or water temperature. **Write or call: Superior Combustion Industries, Inc., Times Building, New York City, for details on packaged boiler unit.**

Vinyl primer tolerates moisture

. . . on damp metal surfaces, making it possible to secure good vinyl-coating applications where surface dampness cannot be completely eliminated before the primer is applied, the maker claims. The Prufcoat vinyl-weld primer P-62 may be applied by brush, spray, or roller. It is said to be particularly suited for hot-spray application. **Write or call: Prufcoat Laboratories, Inc., 63 Main Street, Cambridge 42, Mass., for details on new vinyl primer.**

Send this **Showcase Coupon**

to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

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Described in OIL AND GAS JOURNAL · Issue of June 23, 1958

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

DATE.....

Solid master bushing for rotary table

. . . promises to reduce bushing and table wear, drill-pipe distortion, and gouging during deep drilling, the maker reports. The new bushing is designed for National Type MS 27½ rotary tables. A solid outer body of alloy steel absorbs the thrust or transverse load induced by the vertical load of the drill string against the tapered bowl. The inner bowl consists of separately removable halves. Both the body and the inner bowl can be removed in a single lift. Driving surfaces of the body and bowl are flame-hardened for wear resistance.

The solid master bushing makes slips seat properly within the inner bowl, giving complete support to the drill pipe and maintaining the correct API taper for a long time, according to the maker. **Write or call: National Supply Co., 2 Gateway Center, Pittsburgh, for details on solid master bushing.**

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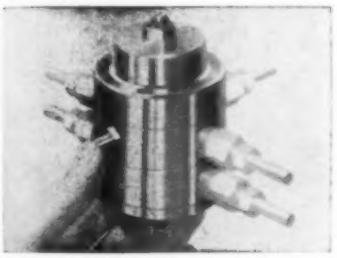

Pneumatic monitoring instrument

. . . trips when a pneumatic signal violates its maximum or minimum setting. The device stays tripped after the signal is restored to normal limits, until manually reset.

Maximum pressure range is 250 psi. Minimum-trip pressure is adjustable between 1 and 100 psi. The instrument is called the Mite 73. It comes in aluminum, brass, or Type 18-8 stainless steel.

Three models are available. They automatically trip on a decreasing instrument-air signal and either vent or lockup downstream air. They permit independent tripping from a remote point or automatic tripping when the air signal goes above or below the predetermined signal. **Write or call: George W. Dahl Co., Inc., 86 Tupelo Street, Bristol, R. I., for details on Mite 73.**

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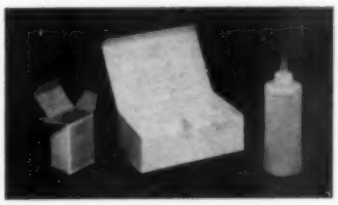

Kit tests portable gas detectors

. . . in the field. It helps assure that readings obtained are accurate. The kit uses a known-percentage mixture of methane and air for checking the reading on the gas indicator's meter.

To make a test, an ampoule of methane is broken inside a plastic bottle. The methane-air mixture is fed into the indicator by squeezing the bottle. Complete instructions come with the kit. It lists for $5.00. **Write or call: Johnson-Williams, Inc., 2781 Park Boulevard, Palo Alto, Calif., for details on portable gas detector test kit.**

●

Teflon tape is pressure sensitive

. . . and can be attached to metal, wood, rubber, glass, plastic, or other rigid materials by contact pressure. The Flexrock pressure-sensitive Telfon tape consists of an adhesive applied to surface-treated Teflon. For protection of the tape during storage, a stripable paper backing is used.

The tape makes it easy to face equipment. It can be used to cover chutes, slides, rolls, guide rails, and measuring and feeding devices. Sizes are available from ½ to 12 in. The tape is 0.005 in. thick and packaged on 100 ft. spools. **Write or call: Flexrock Co., Packing Div., 3610-J-Filbert, Philadelphia 1, for details on pressure-sensitive Teflon tape.**

DESIGNED, TESTED AND PROVEN IN THE OIL FIELDS

Screened Air Port

Unexcelled . . . for Outdoor Use

- DRIP PROOF
- VERMIN PROOF
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All these features of Fieldmaster Ball Bearing Motors have been designed to overcome the rugged conditions of Oil Field requirements.

CHECK THESE OUTSTANDING ADVANTAGES.

Heavy Cast base for alignment, stability, heavy duty, double-shielded, prelubricated bearings, reduces lubrication worries, high grade silicon steel in the magnetic circuit reduces iron losses . . . Wide variety of windings provides triple ratings, dual voltages . . . high torque licks heavy starting problems. High slip is available to take care of reciprocating load requirements encountered in pumping.

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PUMPS FOR HIGH WATER-OIL RATIO WELLS

High capacity Reda Pumps produce fluid volumes up to 18,000 barrels per day from standard size casings. You can profitably produce wells with a high water-oil ratio. Investment cost per barrel of daily capacity is far lower when you choose REDA for high water-oil ratio wells.

INCREASE YOUR *PROFITS* WITH REDA SUBMERGIBLE ELECTRIC PUMP ADVANTAGES:

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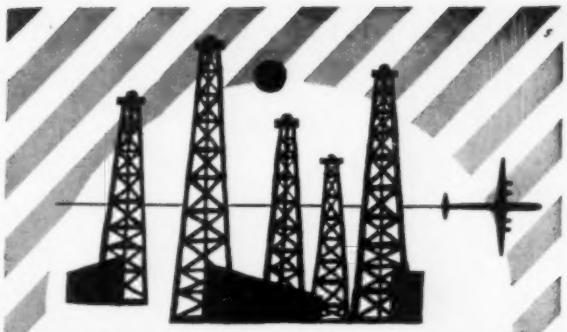
Manufacturers of submergible motors and pumps for over 35 years — for oil, brine and water wells, gasoline and jet fuel —



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You can get the "Roustabout 1523" at your favorite supply store!

Why the "Roustabout 1523" is the best all-purpose jack for drillers

First, the "Roustabout" (Jack No. 1523) has plenty of power—15-ton capacity for loads applied to either head or foot lift. Second, this well-balanced jack can work at any angle at full capacity (note swivel base). Third, its slotted head takes special claw or chain for lifting, lowering, pushing or pulling pipe, beams, poles, etc. Fourth, the "Roustabout" oil field jack is equipped with a patented adjustable spring mechanism which assures positive engagement of rack teeth. The spring's tension can be easily adjusted with a screw driver without removing any part of the jack. Send for Oil Field Jack Bulletin Ad-19B.

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SHOWCASE . . .

New Literature

Protective housings

. . . for fire-fighting equipment and safety-flash arresters are described in a new four-page catalog. Portable fire houses, peerless weatherproof fire-extinguisher boxes, hose-reel houses and safety-flash arresters are the four main products described. The housing is designed for compact and convenient, weatherproof covering of a wide range of fire-fighting equipment. The arrester is a sectional assembly that is designed to minimize the dangers of heater operation. **Write or call: Moran Furnace & Sheet Metal Co., 807 East Fifth Place, Tulsa 20, for Safety Equipment catalog.**

Heat-exchanger bulletin

. . . describes a new unit—called Fin Pak—that can operate with low-pressure drops under high-pressure differentials for gas to gas, gas to air, or gas or air to liquids. The 12-page booklet presents flow diagrams of five applications: on open-cycle gas turbines, gas-cooled reactors, closed-cycle gas turbines, and diesel or gas engines, and as a waste-heat boiler. **Write or call: Air Preheater Corp., 70 East Forty-Second Street, New York 17, for Fin Pak bulletin.**

Grayloc tubing

. . . dimensions, pressures, and performance properties are described in a new eight-page booklet. The tubing features a joint which provides positive leak resistance at high pressures, the maker says. Line drawings illustrate the sealing principle. They show the line seal at initial contact, and the surface seal at the made-up position. **Write or call: Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, for Grayloc Tubing bulletin.**

How to select flowmeters

. . . is covered in technical Bulletin 91-119. It gives criteria for choosing the type of flowmeter to be used in measuring a given fluid. Advantages and limitations of basic types are listed in chart form. Major manufacturers of various types are also given. **Write or call: Fischer & Porter, 547 Jacksonville Road, Hatboro, Pa., for Bulletin 91-119.**

Packaged generator-control

. . . unit is described in a new bulletin. The Model CU-1 is designed for a.c. generators to 200 kw., depending on

exciter characteristics. It will accomodate any combination of two or three indicating meters including meter-transfer switches when required. It has a hinged front panel for ease of installation and servicing and both automatic and manual voltage regulations. The bulletin includes specifications and details about the model. **Write or call: Simplex Co., Inc., Springfield, Ill., for package generator-control unit bulletin.**

Prefabricated panel insulation

. . . system for high or low temperature service and a fire-protective covering are detailed in new 12-page Bulletin 17A. It's designed for vertical or horizontal storage and process vessels, ducts, and heat exchangers. The insulation is made up of an outer covering of metal and a main insulation mass. This insulation is enveloped in aluminum foil for inner protection. And a galvanized wire-mesh retainer secures the aluminum foil. The bulletin features heat-loss charts and details of panel-insulation applications. **Write or call: Universal Fabricated Products Co., 80 East Jackson Boulevard, Chicago 4, for Bulletin 17A.**

Application of radioactive tracers

. . . in oil and gas reservoirs is described in new and comprehensive Bulletin 756. This 11-page bulletin explains an oil and gas-field tracer service now available. In addition, it explains the fundamentals of radioactive tracing in oil and gas reservoirs. It tells how tracers are introduced into the reservoir, how to take field samples, and how they are assayed in the laboratory. And it goes into the significance and interpretation of results. The bulletin lists typical costs for the radioactive-tracer service too. **Write or call: Electrochemical Laboratories, 530 South Lewis Avenue, Tulsa 4, for Bulletin 756.**

Centrifugal pumps

. . . for corrosive liquids are reviewed in a new catalog. The pumps offer capacities from 1 to 80 g.p.m. at heads to 70 ft. They come in two materials: Type 20 stainless steel and Hastelloy C. The sealing arrangement utilizes a ceramic face applied to the back of the impeller and a five-piece balanced mechanical seal.

The 24-page catalog includes an abridged list of fluids handled and a quick-reference sheet and selection chart. These make it easy to select pumps by capacity and model number. **Write or call: Bart Mfg. Corp.,**

Fabricated Structural Steel and Fabricated Reinforcing Steel for Bridges, Commercial and Industrial Buildings: Schools, Hospitals, Power Plants, Coal Washing Plants.

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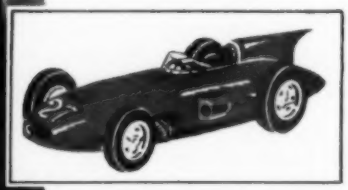

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SACRAMENTO, CAL.
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SAN DIEGO, CAL.
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811 Austin St.

WACO, TEX.
224 S. 15th St.

SALT LAKE CITY, UTAH
1552 S. Second West

227 Main Street, Belleville 9, N. J., for pump catalog.

Pulse-code telemetering

. . . equipment for remotely indicating positive-displacement meter readings is detailed in new four-page Bulletin CP-3701. And Bulletin CP-3702 explains the company's time and data printer for use with the pulse-code telemetering systems. Both bulletins detail performance and construction features. **Write or call: Vapor Recovery Systems Co., 2820 North Alameda Street, Compton, Calif., for Bulletins CP-3701 and CP-3702.**

Bronze flexible connectors

. . . designed to convey gases or fluids at temperatures up to 400° F. are detailed in new Bulletin UC3. They are leakproof and highly corrosion resistant, the maker says. The outer cover is braided for extra strength. Flanged, solid male and female-union connections are available. Inside diameters range from ¼ to 4 in. The bulletin covers the company's complete line. And it includes a price list. **Write or call: Universal Metal Hose Co., 2133 South Kedzie Avenue, Chicago 23, for Bulletin UC3.**

How air-photo interpretation

. . . provides essential soils and geologic data for engineering projects is reported in a new four-page folder. Soils can be mapped for their engineering properties, according to Aero engineers and geologists. They say soil texture, plasticity, and internal and external drainage can be determined by experienced photo-interpreters. From stereoscopic study of overlapping air photos, estimates of susceptibility to slides, depth of bedded rock, and rock types can also be made. **Write or call: Aero Service Corp., 210 East Courtland Street, Philadelphia 20, for air photo interpretation bulletin.**

"Hot spot" cathodic protection

. . . for bare or poorly-coated pipelines is described in a new four-page report. It presents an economic comparison between the use of Galvomag and H-1 alloy magnesium anodes. The reports show that with Galvomag anodes, fewer are needed and reduction in number neither decreases the amount of protection nor shortens the life of the installation. **Write or call: Corrosion Services, Inc., P. O. Box 7343, Tulsa, for "hot spot" protection report.**

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Novi SPEED ALERTER

A sure warning of excess speeds!

• Simple Installation! • Fingertip Control! • Attractive Design!

The NOVI SPEED ALERTER—a major safety development—can be easily installed on any car in a few minutes, and will turn on a red light whenever a pre-selected speed is exceeded, or when accelerating at an excessive rate. Speed setting can be varied betwen 15-100 MPH by a simple movement of a control installed below instrument panel. Warning light is located on top of instrument panel. Its shield can be rotated for easy visibility. The Novi Speed-sensing unit is sealed to assure trouble-free performance.

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OAKLAND, CAL. 683 26th St.
SACRAMENTO, CAL. 430 "R" St.
SAN DIEGO, CAL. 3143 Kettner
MIAMI, FLA. 2840 N.W. 7th Ave.
ATLANTA, GA. 190 14th St. N.W.
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INDIANAPOLIS, IND. 750 Massachusetts
NEW ORLEANS, LA. 4303 Bienville St.
DETROIT, MICH. 20830 Coolidge Hwy.
KANSAS CITY, MO. 114 Southwest Blvd.
ST. LOUIS, MO. 7001 Chippewa
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HOBBS, N. M. 1320 W. Marland
CINCINNATI, OHIO 2512 Gilbert Ave.
OKLAHOMA CITY, OKLA. 1600 Linwood Blvd.
TULSA, OKLA. 24 E. 11th St.
PHILADELPHIA, PA. 4th & Wyoming
PITTSBURGH, PA. 2020 W. Liberty Ave.
MEMPHIS, TENN. 475 Union Ave.
ABILENE, TEX. 2809 N. 2nd St.
AMARILLO, TEX. 2722 Duniven Cr.
AUSTIN, TEX. 2026 E. Avenue
DALLAS, TEX. 1810 Irving Blvd.
EL PASO, TEX. 6906 Alameda
FT. WORTH, TEX. 1101 Norwood St.
HOUSTON, TEX. 6658 Gulf Freeway
LUBBOCK, TEX. 1305 Ave. "H"
MIDLAND, TEX. 3508 West Wall
SAN ANGELO, TEX. 108 N. Pierce
SAN ANTONIO, TEX. 811 Austin St.
WACO, TEX. 224 S. 15th St.
SALT LAKE CITY, UTAH 1552 S. Second West

Geophysical Associates International occupies

. . . this 9,000 sq. ft. headquarters building in Houston. This new building is divided into sections for administrative, stenographic, drafting, mapping, magnetic equipment research and assembly, supply, and storage.

Geophysical Associates and its affiliated companies offer the petroleum and minerals industries complete coordinated geophysical services and interpretation through gravity meter, airborne and ground magnetometer, airborne and ground electromagnetic methods, electrical methods, and seismograph.

Principals are Dr. L. L. Nettleton, E. Joe Shimek, and Dr. Nelson C. Steenland. Operating divisions are Gravity Meter Exploration Co.; Geophysical Associates; Muskeg Equipment Rentals, Ltd.; GMX Corp.; C. A. Asociados Geofisicios Internacional de Venezuela; C. A. Exploradora Gravimetrica; Asociados Geofisicios Internacional S. A.; Geophysical Associates International, Inc.; and Liberty Exploration Co.

Graver Tank & Mfg. Co. appoints W. C. Root

. . . to the position of president and chief executive officer, according to Edward N. Gosselin, chairman of the board. He also announced that Jalmer E. Swason, current president of Graver, has moved to the post of vice chairman of the board.

W. C. ROOT

Root joined Graver Tank in April, 1958 as executive vice president. Previously he was project manager for Canadian Bechtel, Ltd. He began his career as an engineer with Shell Oil Co.

Crane Co. elects Brown, Karr, and Wyatt

. . . according to an announcement from Neele E. Stearns, president and chief executive officer.

Elected vice president for sales was W. O. Brown. K. L. Karr was elected secretary and general counsel. E. E. Wyatt was elected assistant to the president for administrative planning.

Brown has been with Crane since 1930. He has served as general manager of sales, manager of West Coast sales district, and manager of plumbing sales department at the general office in Chicago.

Karr has been secretary since April 1951. He joined the company in 1946. Wyatt joined Crane in 1938. He has held a number of administrative posts in several divisions of the company.

Also announced was the election of Mark K. Lowell as chairman of the board of directors. He is a vice president of Continental Illinois National Bank & Trust Co.

Clark Bros. Co. promotes R. E. Jenkins, R. J. Spears

. . . as assistant general sales manager at Olean, N. Y., and assistant general sales manager, respectively. Jenkins' new responsibilities will include the supervision of all Clark district and branch offices in the areas west of the Mississippi River. Spears will supervise the company's eastern district offices of Boston, New York, Philadelphia, Detroit, Pittsburgh, Chicago, and Atlanta.

R. E. JENKINS

R. J. SPEARS

Jenkins joined Clark Bros. in 1948. After spending 6 years in Los Angeles in sales engineering, he returned to Olean in 1956 as administrative sales manager and held that position until his present appointment.

Spears began his career 22 years ago in the sales engineering department of Clark in Olean and was later appointed manager of the company's New York district office. His successor in New York will be Ralph C. McDonald, until recently the manager of Clark's Philadelphia office.

Clark Bros. is one of the Dresser Industries.

Joe Roughneck represents oil, gas at annual meet

. . . of American Iron & Steel Institute in New York City. The institute, composed of more than 250 iron and steel companies of the United States and Canada, selected this symbolic character to appear as guest spokesman before the meeting's general assembly.

"JOE ROUGHNECK"

"Joe Roughneck" is the ficticious character around which Lone Star Steel Co. has built its public relations-customer relations program. Lone Star does not operate competitively in the over-all iron and steel industry, but is a producer and supplier of pipe strictly to the oil and gas industry.

L. D. (Red) Webster, Lone Star vice president in charge of public relations and advertising, presented the commentary accompanying 22 colored slides that depicted the activities which have made the character not only the company's star salesman, but an accepted personification of the petroleum business.

L. D. WEBSTER

A Roughneck Club formed about 4 years ago is still adding to its chapters with memberships held strictly to men of the working oil industry, nominated by other oil men. A wall plaque, bearing the Joe Roughneck likeness, is presented to each new member with the citation, "Honorary Life Member, the Roughneck's Club, in recognition of rough and ready service in the field." Sole purpose of the club is to

recognize the pioneers whose perseverance and courage have made our nation the world's leader in petroleum.

Joe Roughneck is used not only in trade advertising, but also appears in the form of a cast-iron bust as an industry memorial in Pioneer Park developed by Lone Star near the discovery well of the East Texas oil field. Since the inception of the Roughneck idea, Don L. Baxter, Inc., Dallas-based advertising agency, has worked with Webster both in planning and execution of the program.

Black, Sivalls & Bryson, Inc., names N. D. Baker

N. D. BAKER

. . . to the newly-established position of director of employe and public relations, reports Kenneth W. Lineberry, president. Baker, advertising and sales promotion manager since 1951, continues responsible for all advertising, promotion and public relations activities and additionally will serve in a staff capacity on employe relations, reporting to the president.

In his new assignment, he will work on an advisory basis with officers and division managers in all areas affecting employe relations. He has been with BS&B since 1950.

Baker has assigned enlarged areas of responsibility to three members of BS&B's advertising staff. Arvid H. Edwards has been named assistant advertising manager, working with all phases of the company's advertising and publicity programs. John H. Boetjer has been appointed publications manager, responsible for promotional literature, direct mail, and catalogs. Frank L. Carder has been named production manager for the advertising department.

Linea Aeropostal Venezolana inaugurates

. . . a 6-hour nonstop Super-G Constellation service from New Orleans to Maracaibo, Venezuela. Established primarily to serve the natural pattern of oil traffic between the southwestern United States and the oil capital of South America, LAV's new flight continues on from Maracaibo to Caracas. George Weinreb, LAV regional manager at New Orleans, said the 30-year old, government-owned airline will offer 3-times weekly flights, nonstop to and from Maracaibo and one-stop to and from Caracas.

These all first-class flights represent

FIRST in their fields
CURTIN CENTRIFUGES
• Lightweight
• Rugged
• Dependable
More than thirty years' leadership is reflected in the consistent efficiency and dependable service of the Curtin Series 53 Hand Centrifuges. Some distinctive features are: (1) Rugged, lightweight aluminum castings. (2) Body, crank, spindle nut, and heads interchangeable on both 15 cc and 100 cc models. Trunnion cups replaceable. (3) Crank instantly disengages — no agitation of sediment. (4) Drive shaft and spindle are stainless steel. Spindle shaft is ball bearing mounted for easy turning. Curtin centrifuges meet all API and ASTM specifications. Both 15 cc and 100 cc models are available for immediate shipment.
15 cc size No. 3420-53
CURTIN CENTRIFUGE TUBES
• Permanently Marked Graduations
• Retested For Accuracy
• Heavy, Uniform Glass Walls
Curtin centrifuge tubes are accurately calibrated and graduations are permanently marked with white pigment fused into the glass. Graduation lines are fine and sharp to permit easy, quick reading. Every tube is thoroughly annealed for mechanical strength and individually retested for accuracy.
The tubes are of heavy-walled glass with all dimensions carefully controlled for uniformity in size and shape. Tops are finished with a machine tooled reinforced bead. Curtin centrifuge tubes meet API-ASTM specifications and are available in 15 cc and 100 cc sizes. As accuracy in testing B. S. and W. affects profits, specify Curtin Centrifuge Tubes.
100 cc size No. 3948
15 cc size No. 3895
FREE CATALOG
Write for 24-page catalog G-56, "Petroleum Gaging Equipment."
W. H. CURTIN & CO.
DOMESTIC EXPORT • CURTIN
PETROLEUM TESTING EQUIPMENT
HOUSTON - DALLAS - NEW ORLEANS - JACKSONVILLE
Sales Offices: TULSA • BIRMINGHAM • CORPUS CHRISTI
Subsidiary: CURTIN DE MEXICO, S.A. de C.V., MEXICO CITY
Established 1922 U.S.A.

A. S. J. SHAW

DEMOCRAT FOR

STATE TREASURER

IN OKLAHOMA

the start of its first nonstop service between New Orleans and Maracaibo. It is the third U. S. route to be operated by LAV, which flies between New York and Caracas and Miami and Caracas.

Flight schedules to and from New Orleans are: leave New Orleans Tuesdays, Thursdays, and Saturdays at 10:30 p.m.; arrive Maracaibo Wednesdays, Fridays, and Sundays at 6:00 a.m.; leave Maracaibo at 6:45 a.m.; arrive Caracas at 8:00 a.m.

Leave Caracas Tuesdays, Thursdays, and Saturdays at 10:30 a.m.; arrive Maracaibo at 11:15 a.m.; leave Maracaibo at 12:00 noon; arrive New Orleans at 4:30 p.m.

J. D. Kimmel appointed

. . . sales and design engineer by Oil Metering & Processing Equipment Corp.

Prior to joining Oil Metering, he worked as an engineer for Philips Petroleum Co. and Union Oil of California. He was most recently employed by Parkersburg Rig & Reel Co. as a sales engineer for oil production equipment.

Frank S. Sawyer appointed

. . . as manager of construction by J. F. Pritchard & Co., Kansas City, Mo., an engineering, designing, and construction firm.

He comes to Pritchard with four decades of experience in the construction industry.

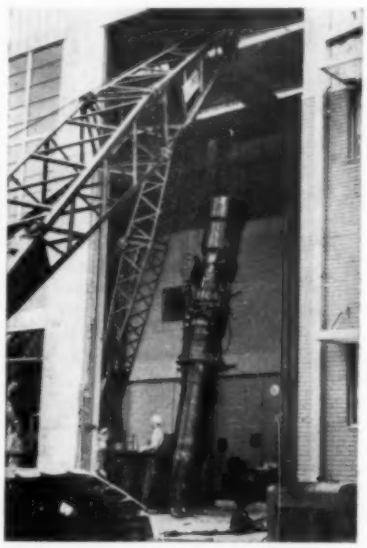
J&L Supply Division appoints H. D. Witt

. . . as store manager at El Dorado, Kans., according to A. G. Bastian, manager, field sales division at Tulsa.

Witt has been a salesman at El Dorado since 1952. He joined J&L in 1944 as a storeman at Perry, Okla., and later was transferred to J&L stores at Crescent, Okla., and Winfield, Kans.

Kansas district sales headquarters are at Wichita under the direction of J. A. Carrigan, district sales manager.

POWER
for tough jobs!
BRUTE POWER is what it takes to handle a heavily loaded 90-ton construction barge—and *brute power* is what the Evinrude "Four-Fifty" delivers—quietly, smoothly, day after day. 50 b.h.p. at 4000 r.p.m. New, compact V-4 design. See your Evinrude dealer—he's listed in the yellow pages under "Outboard Motors." Evinrude Motors, 4323 North 27th Street, Milwaukee 16, Wis. *A Division of Outboard Marine Corporation. In Canada: Mfd. by Evinrude Motors, Peterborough.*
EVINRUDE outboard motors



72,000-lb. pressure vessel is lowered into position

. . . in the new high-pressure laboratory of Schlumberger Well Surveying Corp. This vessel has a working pressure of 30,000 psi. at 450° F., equivalent to hydrostatic pressures to be encountered in wells drilled below 30,000 ft. with normal drilling muds.

The new laboratory, intended chiefly for research, was made necessary by the strides made by the oil industry toward deeper drilling. The vessels are also used extensively in the testing of casing perforating equipment.

Smithco Engineering, Inc., announces completion

. . . of this new manufacturing facility in Tulsa, according to Orville Smith, president. The building contains over 10,000 sq. ft. of floor space. Now in full operation, the plant employs the production line system of manufacturing with an overhead crane-way and largely automatic throughout.

The property, 11 acres in all, is adjacent to the Midland Valley Railroad and has complete facilities for the shipping and receiving of materials.

Cyrus V. Helm becomes Midland division manager

C. V. HELM

. . . of The Western Co., according to Walter Beadle, vice president in charge of sales and operations.

Helm was regional manager for Western in the Midland office. He joined Western at Levelland, Tex., in 1948 as a student treater. He served as district engineer at Odessa, as station manager at Ulysses, Kans., staff assistant to Beadle in Midland, and district manager at Healdton, Okla.

He will direct sales and operations activities of the company in West Texas and the southeastern New Mexico area.

J. P. Moreton appointed resident representative

. . . of The Canadian Bank of Commerce in Dallas, Tex. He was manager of the bank's business development department in the Alberta region and was closely connected with the petroleum and natural gas department until his present appointment. He has more than 20 years' service with the bank.

E. L. Logrbrinck named director of marketing

. . . by Ric-wiL, Inc., a supplier of prefabricated underground piping systems.

He formerly held positions with Great Lakes Steel Corp., Standard Steel Spring Co., Blaw Knox Construction Co., Standard Oil of Indiana, and Wonder Building Corp. of America. His new assignment will include coordinating and directing the overall sales program of Ric-wiL.

Oil Well Supply Division shifts C. O. Damron, Jr.

. . . from manager of the Pauls Valley, Okla., store to Blanding, Utah, announces R. L. Armstrong, Rocky Mountain area manager of the division of U. S. Steel Corp.

Damron joined Oilwell in 1951 at Oklahoma City and transferred to Seminole, Okla., in 1952. He was named field representative at Cushing, Okla., in 1953 and moved to Pauls Valley in January 1954 and to Lindsay, Okla., in March 1954. Two years later he became store manager at Pauls Valley.

Waukesha Sales & Service, Inc., makes four additions

TED SKEEN

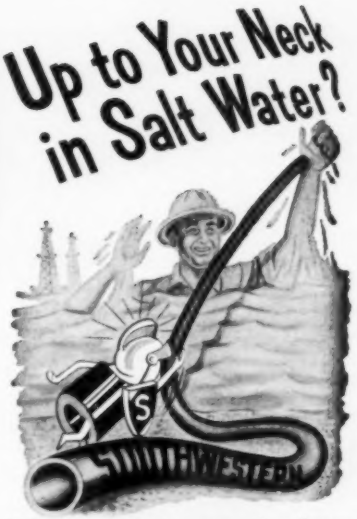
. . . to its sales and service staffs in Texas. S. W. Wacey, formerly North Texas division manager, Wichita Falls, has been transferred to Houston as assistant to the vice president in charge of sales. Ted Skeen has been appointed manager of engine sales and will locate in Dallas. New district

JOE DOWNS

H. F. LEAVITT

manager in San Antonio is Joe Downs. New sales engineer in Abilene is Harold F. Leavitt.

Skeen was with Climax Engine Co. before joining Waukesha. Downs was



Make your *next* pipe replacement your *last*

with

Southwestern

PVC and KRALASTIC

Plastic Pipe

SALT WATER DISPOSAL becomes the *least* of your production problems, because SOUTHWESTERN Plastic Pipe:

Does not react to electrolysis, corrosion or salt water or sour crude;

Is installed quickly and simply, at very low cost;

Requires absolutely no maintenance cost for years.

ENGINEERS ON CALL: a trained staff of APPLICATION ENGINEERS is on call to consult with you in your pipe needs.

Mail Today!

Gentlemen:

☐ Please send me additional information.

☐ Please have APPLICATION ENGINEER call.

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POSITION _____

ADDRESS _____

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"Use Southwestern . . to be sure"

MANUFACTURED BY

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PLASTIC PIPE CO.

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Phone FA 5-3344

SWP-3

executive vice president of A. D. Cook, Inc., a vertical turbine pump manufacturing firm, and for the past 4 years represented Climax Engine in Texas. Prior to joining Waukesha, Leavitt was with Hercules Motor Corp. in Houston.

David E. Fields appointed

. . . as exclusive sales representative for Fluor Products Co. for Oklahoma and parts of Arkansas, Kansas, Missouri, Tennessee, and Texas.

Prior to this appointment he was manager, metal products sales for Fluor. He has been with Fluor for 2 years. He formerly served with Flint Steel Co.

Easiest way to file and find confidential maps, tracings, blueprints. Quality metal cabinet file with locking doors. 112 tilting tubes handle 60" prints. Tubes indexed for quick location. Ideal for field and home offices. Shipped from stock.

Patent No. 1610368. Other Patents Pending.

SCOTT-RICE CO., 610 S. Main, Tulsa 3, Okla.

L. G. Cook named sales and service representative

L. G. COOK

. . . for H. C. Smith Oil Tool Co. in Venezuela, according to Arthur S. Marshall, vice president, sales. Cook will headquarter in Maracaibo.

For the past year and one half Cook was with the sales organization of Petro-Tech, C. A. in Venezuela. Prior to that he was active in sales and service of oil field equipment in Texas and Louisiana for over 10 years.

The Oliver Corp. names J. E. Carr as manager

. . . of the industrial division with headquarters at the Cleveland, Ohio, plant, reports Alva W. Phelps, chairman and president.

J. E. CARR

Carr is a veteran of 29 years in Oliver's sales organization, most recently as manager of its Des Moines, Iowa, sales branch. In his new capacity, he will direct all sales activities in the United States and Canada for Oliver's full line of industrial crawler and wheel tractors, as well as allied equipment.

Clifford R. Williams named chief engineer

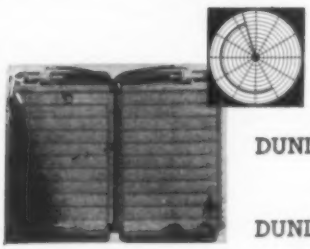
C. R. WILLIAMS

. . . of Brewster Co., Harry B. Marioneaux, vice president and general manager, has announced.

Williams has been with Brewster for the past 4 years. He formerly served with Ingersoll-Rand Corp. and J. B. Beaird Co., Inc. In his new capacity at Brewster, he will head the engineering division and supervise the designing of the Brewster line of draw works for drilling both offshore and onshore in a depth range of 2,500 ft. to 20,000 ft. plus.

Aldrich Pump Co. appoints

. . . Power Service Co., Inc., Casper, Wyo., as exclusive representative for the general Rocky Mountain and Williston basin areas. It will carry field part stocks for Aldrich direct flow pumps.



Turn Your **COOLING UNITS** *into* **PRECISION EQUIPMENT**

with . . .

DUNLAP **THERMOTROL** Units
for radiators

DUNLAP **THERMOMOTOR** Controls
for selective automation

Limit the temperature variation of your cooling units to plus or minus 1° with shutters and controls built and designed by Dunlap — the name that stands for the strongest, most versatile and easily installed auxiliary cooling equipment made today. For the complete story, write or call . . .

DUNLAP manufacturing company

Box 8356, Dawson Station • Tulsa, Oklahoma • RI 2-5591

LAWSON Santa Gertrudis RANCH . . . Warner, Okla.

BULLS AND HEIFERS FOR SALE

Member of Oklahoma Santa Gertrudis and Santa Gertrudis Breeders International

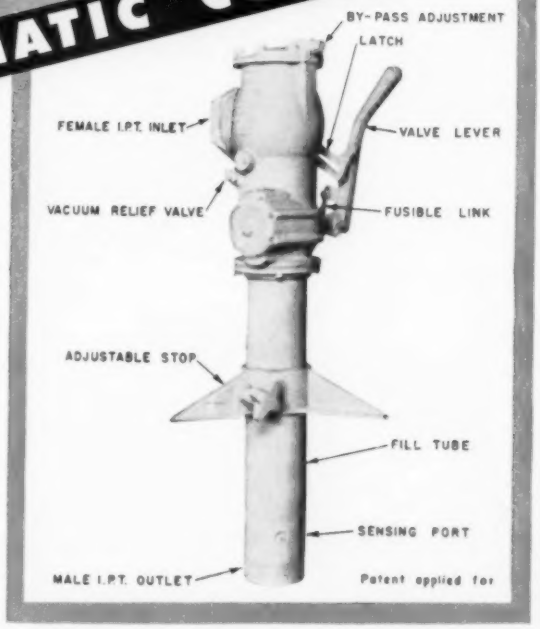
All of our herd bulls are "Running W" King Ranch bulls.
All of our herd cows are Richard King cows.

4 miles east of Warner on U. S. 64 . . . *"Where champions are raised"*
Phone Owen Lawson RI 2-1454, Tulsa or Ralph Johnson HO 3-3545, Warner

OILCO NOW introduces a "FIRST" in

VOLUME SPEED LOADING with POSITIVE AUTOMATIC CONTROL

LOADING LINE
VALVE 1155



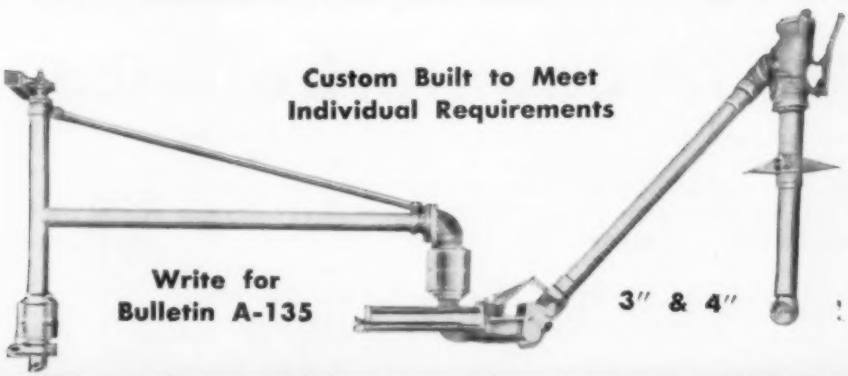
The Valve that Thinks For You

- **VACUUM CONTROLLED**
- *Eliminates congestion at the loading platform*
- **SPILLAGE ELIMINATED**
- *Prevents danger of over-runs*
- **SAFETY FUSIBLE CUT-OFF**
- *Numerous compartments may be filled at one time by one operator*
- **ADAPTABLE TO TRUCK AND TANK CAR LOADING**

The development of this new valve is both sensational and noteworthy. It is NEW and EXCLUSIVE with Oilco, and tests in laboratory and in the field bespeak its usefulness and efficiency in liquid loading operations. Aluminum and bronze constructed. 3″ size weighs 18 lbs.; 4″ size weighs 28 lbs. Bulletin No. 135 gives complete, detailed information. Write for it.

OILCO EXTREME LONG-RANGE LOADER No. 1462

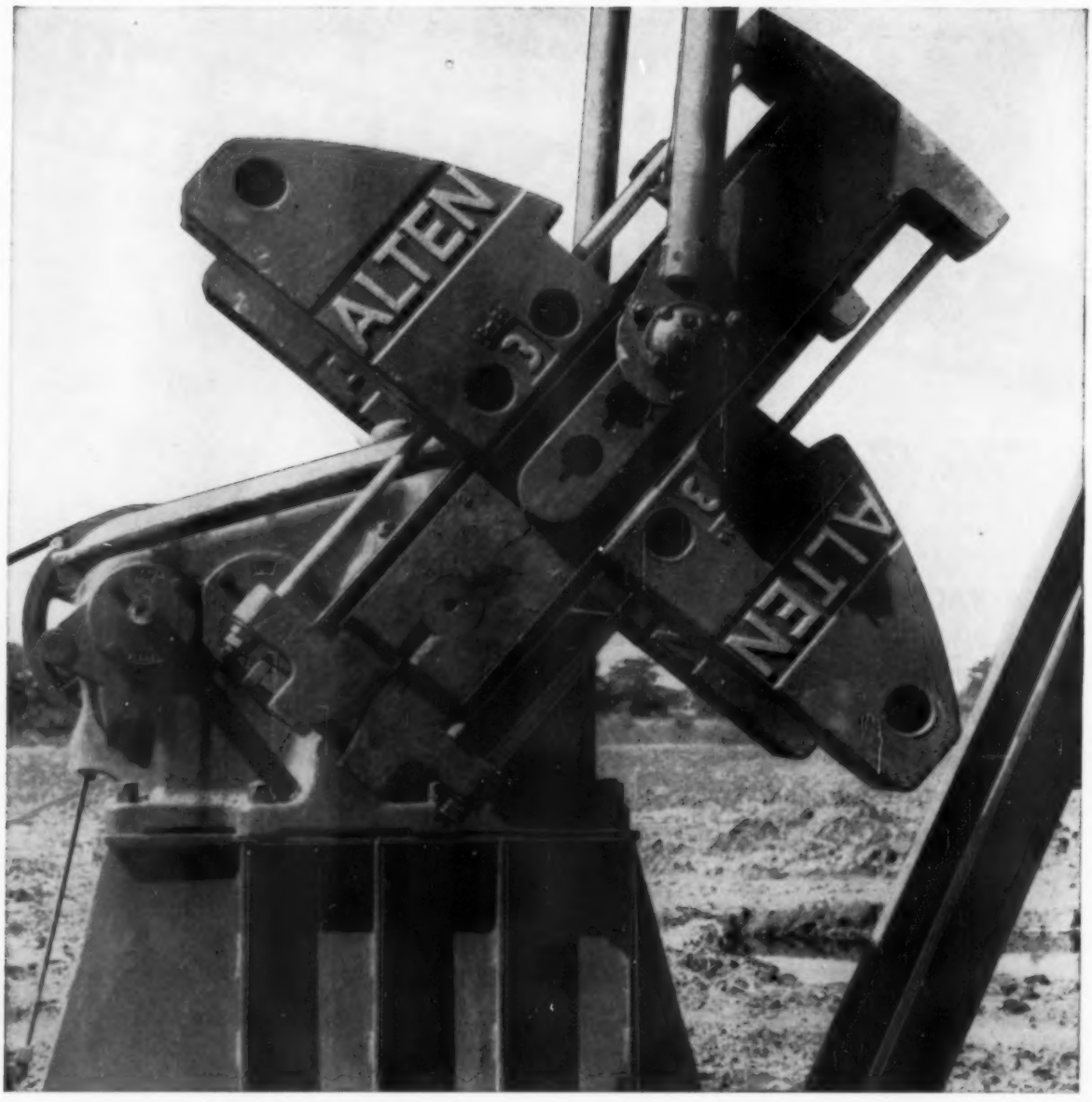
WITH NEW AUTOMATIC SHUT-OFF VALVE



This advanced loader, equipped with the new automatic shut-off valve, speeds loading, eliminates spillage and congestion on the loading rack, and permits operator to fill many compartments simultaneously. After fixed filling point is reached operator tops off in an instant. When valve is open, fire prevention is provided by a fusible link. The valve may be shut off manually by operator at any time. This unit is completely assembled at the factory for quick installation.

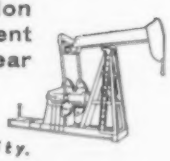
Representatives in all leading U. S. and Canadian cities

OIL EQUIPMENT MANUFACTURING COMPANY
INCORPORATED
3100 VERMONT AVE. LOUISVILLE 11, KY.



Easiest to Counterbalance

One man standing safely on the ground counterbalances an Alten unit in minutes. He loosens three bolts, turns a screw to re-position the weights, and re-tightens the three bolts. No other equipment needed. It's fast, safe and economical. There's an Alten dealer near you. Get the facts from him today.



Complete stock at Odessa, Texas and Oklahoma City.
Twenty-four hour service to mid-continent.

Sold through your Independent Supply Store

ALTEN FOUNDRY & MACHINE WORKS, INC.

OKLAHOMA CITY, OKLA. • ODESSA, TEXAS • LANCASTER, OHIO

BY FRANK J. GARDNER

Deep dig might pay off in Texas' "Blind Belt"

THERE ARE TWO major blind spots in Texas exploration. And they parallel each other. It's reasonable to assume that both should conceal some good oil and gas prospects.

The heartland of Texas is slashed from southwest to northeast by the great curving Balcones fault zone. And it is on both sides of this regional break that we find these two blind spots.

Deeper possibilities . . . Far too little attention has been paid to the deeper possibilities in this region, and the few encouraging signs so far found would indicate that the smart operator will aim his bit at the pre-Cretaceous rocks, east of the Balcones break and north and west of it.

A wide belt of Central Texas country stretching in an S-shape from the Val Verde basin in West Texas around the southern rim of the Llano uplift, north and west of the fault zone holds a great deal of promise for new fields at not unreasonable depths. Target rocks range in age from Cambrian to Upper Cretaceous.

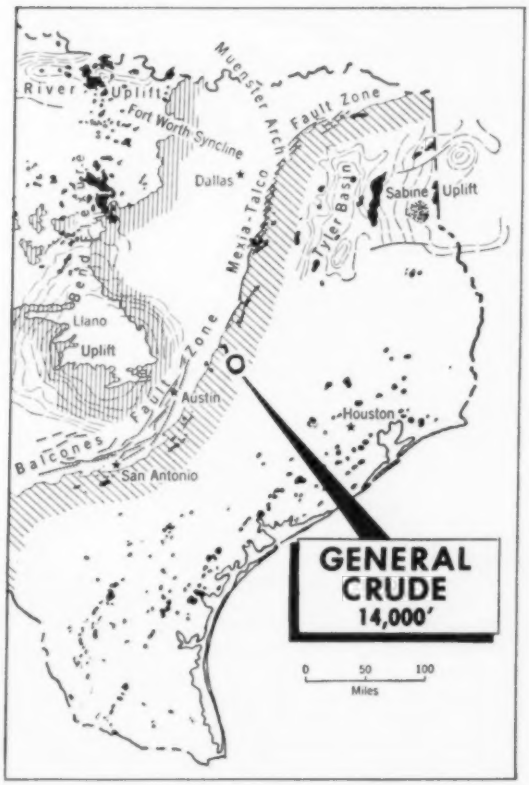
South of the fault zone and east of it lies a parallel region in which the gamble is a little greater and a great deal more expensive, for the chief target here is pre-Cretaceous at depths below 8,000 ft.

There has been some deep drilling on both sides of the fault zone, but not nearly enough to condemn the prospects of these two fairly unexplored belts.

In 1952 in Freestone County, Texas, Humble Oil & Refining Co. drilled its 1 Marberry to 13,595 ft., penetrated the entire Jurassic section, and cored 246 ft. of igneous intrusives below the base of the Jurassic; it went into reddish, fine-grained brecciated quartzitic sandstone of Paleozoic age. It was an historic well, for it was the farthest eastward penetration of the Paleozoic in East Texas at that time, and it shed a lot of light on pre-Cretaceous geology in that region.

Since that time six or eight wildcats per year have gone down for a look at Jurassic possibilities, and several fields have been found.

In Milam County . . . Because of the unusual geological conditions that are uncovered at each new wildcat, every new announcement of a deep test aimed at the Jurassic draws a lot of interest. One such well has just been announced. This is the General Crude Oil Co. 1 Perry, a 14,000-ft. Smackover wildcat to be drilled 9 miles southeast of Rockdale, Milam County.



AN IMPORTANT new deep wildcat has been announced for Central Texas' Milam County. General Crude Oil Co. will sink its 1 Perry to 14,000 ft. for a look at the Smackover-Jurassic possibilities. This will be one of the deepest holes ever drilled in Central Texas. (Base map by Kenneth K. Landes.)

In 1955 Texas Gulf Sulphur Co. abandoned its 1 Fee at a total depth of 12,670 ft. after penetrating Cotton Valley at 9,700 ft. where it found shows of oil. Then, in 1956, Milam County saw another Jurassic test at Rimrock Tidelands 1 Crawford which drilled to 7,003 ft. and penetrated the Smackover.

Could mean new territory . . . General Crude will drill the 1 Perry on a 10,000-acre block 7½ miles southeast of the Texas Gulf dry hole. If it should hit in the Smackover it would extend the productive trend in that formation two counties farther south than now known and would open up a lot of new prospecting territory east of the fault zone.

In the belt west of the fault zone, some even more interesting wildcats have gone on record.

In 1954 in northwest Williamson County, Shell Oil Co. drilled its 1 Purcell to 9,479 ft. It made headlines by testing noncommercial gas in the Ellenburger topped at 6,930 ft., but after penetrating 1,000 ft. of Cambrian, it was abandoned in granite. The showings generated enough electricity to cause more than a million acres to be leased in a trend from Kendall up through Coryell County between the Llano uplift and the fault zone itself.

In southwestern Bell County in 1956 Shell drilled its 1 Massie. This one, north of the 1 Purcell, was perhaps the most revealing test yet. It uncovered some plain evidence of overthrusting, long suspicioned but never proved before.

The two Shell wildcats in this upper blind belt are indicative of some fertile oil-hunting grounds throughout Central Texas. Combine this evidence with the more tangible rewards that have been found in the lower belt across the fault zone, and you'll have a good idea of what lies ahead for East Texas, Central Texas, and Southwest Texas. The easy digging days are nearing their end for operators on the Gulf Coastal Plain, and to find the big oil fields of the future they're going to have to plunge the bit deep in the heart of Texas.

Flank production could mean drainage, so

Navy drills at Teapot Dome

BY EUGENE C. EATON
Consulting Geologist
Casper, Wyo.

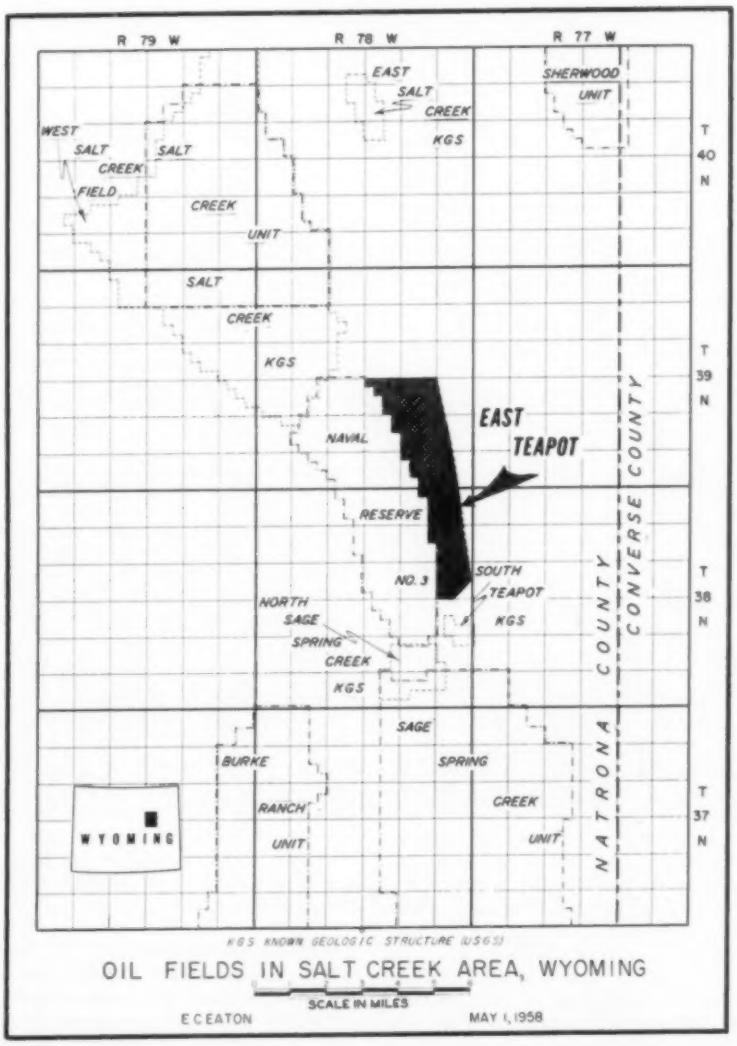
RAPID DEVELOPMENT of the shallow Shannon sand on the east flank of Teapot Dome, Fig. 1, has forced the Navy Department to inaugurate a drilling program to prevent possible drainage.

Preliminary work indicates that parts of at least seven sections are potentially productive from the Shannon inside Naval Reserve No. 3. On 10-acre spacing, this could mean eventually over 300 Shannon wells within the reserve limits.

Teapot Dome, long remembered for the role it played in the scandals of the Harding administration, has been the scene of a vigorous shallow-drilling campaign the last 3 years. There are now 132 wells covering a strip a mile wide and 5 miles long on the east flank of a large anticline, Teapot Dome. The pay zone is the Shannon sand found between 805 and 1,264 ft. The producing area has been termed East Teapot field.

History . . . Teapot Dome has a long and tarnished background. Initial production was established on the present structure in 1914. The discovery went to a total depth of 425 ft. and reported 12 bbl. of oil per day from the Shannon sand between 325-425 ft. (Fig. 2). This is probably the same zone that is now producing on the flank of the anticline outside the limits of the Naval Reserve. The well made 12 bbl. of oil per day and was subsequently abandoned. A year later certain lands on Teapot Dome were set aside for the use of the Navy as Petroleum Reserve No. 3.

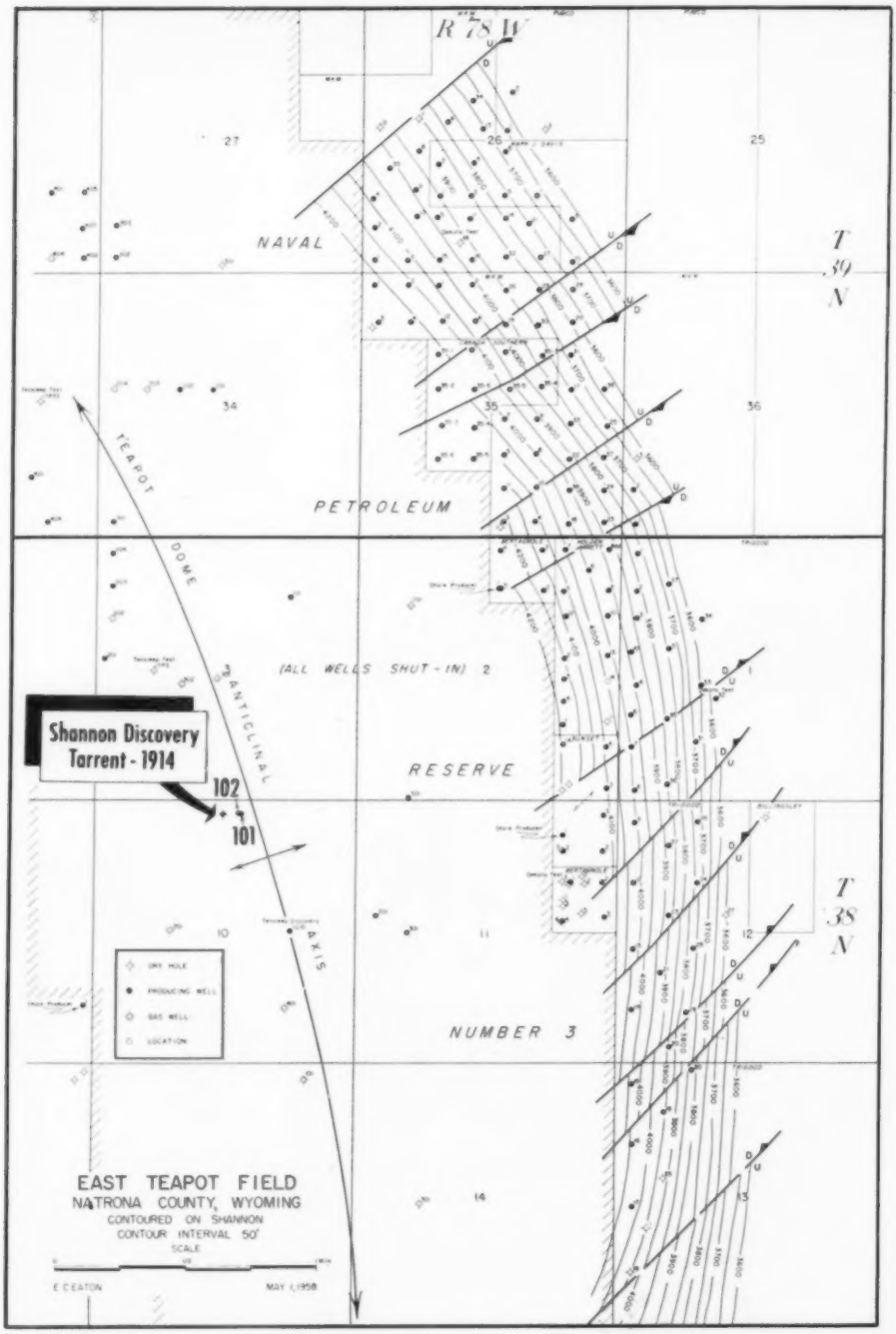
In 1922 a prolific well ¼ mile north of the reserve in Salt Creek field led to the leasing of Petroleum Reserve No. 3 by Mammoth Oil Co. Mammoth inaugurated an active development program and had 60 producing wells by early 1924. These wells were completed in the fractured shale above the first Wall Creek sand, the second Wall Creek sand, or the third Wall Creek sand. The Shannon sand was not produced, but shows were reported in the zone.

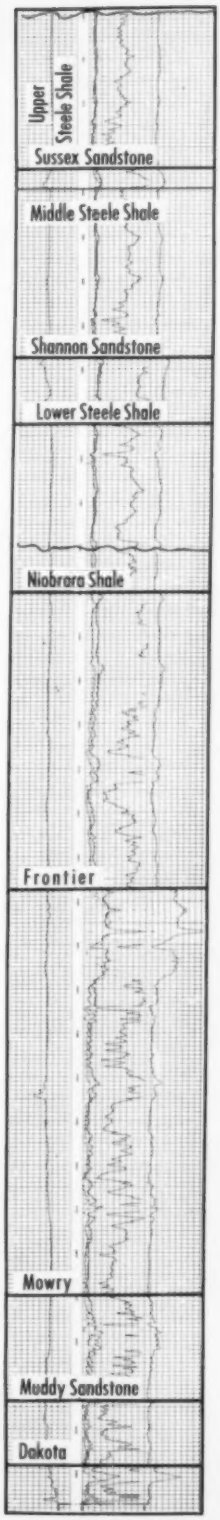


EAST TEAPOT area flanks Naval Reserve No. 3, where the Navy is preparing to drill to prevent drainage. Fig. 1.

Special counsel for the Government filed suit to have the Mammoth Oil Co.'s lease canceled because of irregularities in the leasing procedure, and a receivership was created March 13, 1924, to maintain the status quo within the reserve pending decision of this suit.

The Supreme Court of the United States ordered the cancellation of the lease to Mammoth on October 10, 1927. The receivers shut in the wells





SHANNON is a coarse-grained glauconitic sandstone with varying shale interbeds. It is exposed on the surface north of the most northerly fault shown on the above geological map. Within the producing area, the top of the Shannon sand ranges from 805 to 1,764 ft. Fig. 2.

ONLY THREE WELLS have tested the Dakota at East Teapot. The Dakota in this area is probably a channel sandstone and present nearby production is not confined to structural highs. Fig. 4.

and returned the reserve to the Navy Department on December 29, 1927. The Navy drilled three deep tests in 1951-53 and proved both the Muddy and Tensleep productive over a limited area. There has been no other development in the reserve except as outlined above and no production since December 19, 1927.

East Teapot development . . . The East Teapot area had established production in fractured shale above the first Wall Creek by 1922 in Ostler 1 DeLong Government, SW NW NE 2-38n-78w, adjacent to the reserve. This well was completed for 250 bbl. of oil per day and still makes 7.

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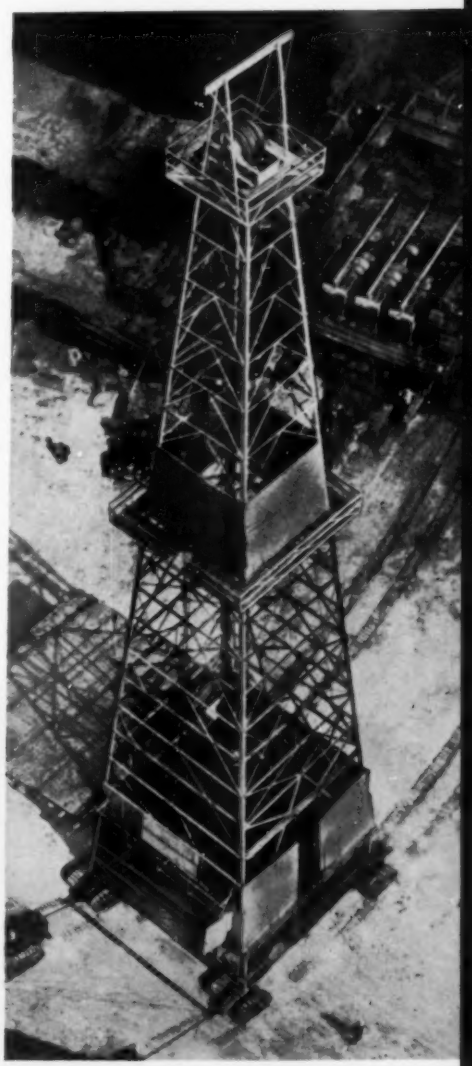

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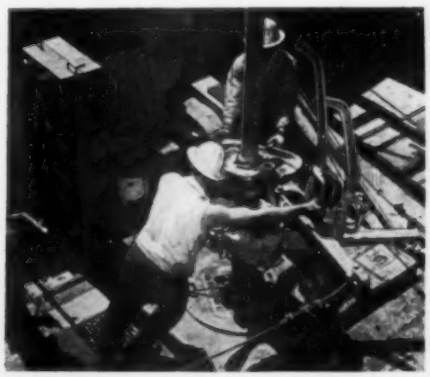

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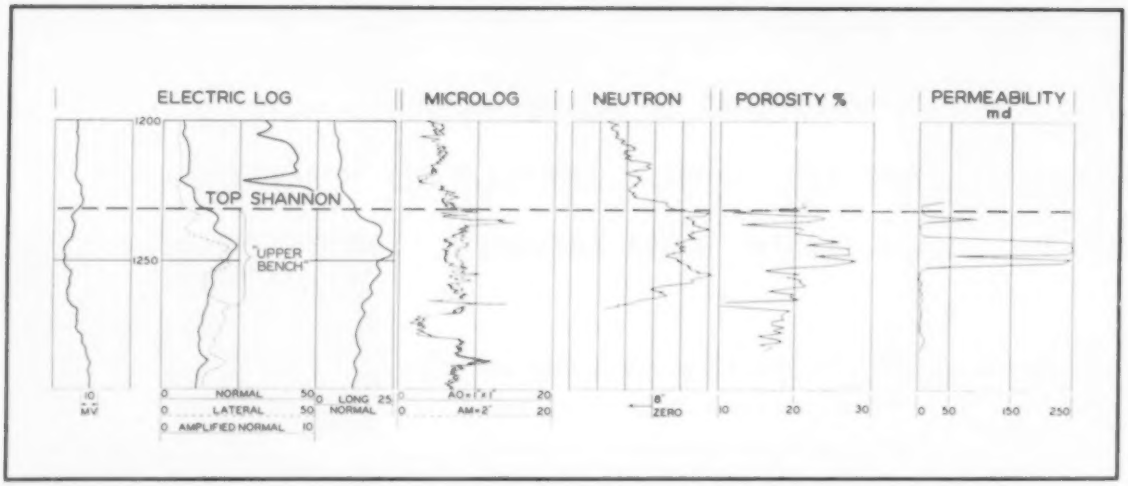


PRODUCTION is limited to permeability developed in the "upper bench" although the "second bench" has had excellent shows of oil. No completions were ever successful in the second bench. Fig. 3.

The Staley Syndicate drilled a dry hole in 1922 into the Shannon in SW NW NW 35-39n-78w. Margelexom 1 Government, W½ NE NE 11-38n-78w, was completed from fractured shale in 1927 for 297 bbl. of oil per day. This well is still producing about 10 bbl. per day.

The three wells mentioned above were the only wells drilled in East Teapot until 1929 when Wyalta Oil Co. drilled two Shannon producers out of five tests in SE NE 11-38n-78w. The two producers were completed for 10 and 16 bbl. of oil per day from the Shannon at 967-1,106 and 1,045-1,163 ft., respectively. These wells were abandoned in 1941 after reporting no production.

Four tests were drilled during 1950-1953. One of these was completed as a well in the Shannon, but the hole was junked.

Current Shannon play . . . Bertagnole 1 Government, NW SE NE 11-38n-78w, was reported abandoned in July 1954, at a total depth of 2,605 ft. in the lower Wall Creek. A good show of oil was noted in the Shannon, 935-55 ft., and the decision was made to plug back and sand-fracture. This well was completed after fracture in the Shannon in August 1954, but was not pumped until October 1954, when it had an initial production of 15 bbl. of oil per day.

Holden & Jarrett drilled a well in SW NE SE 2-38n-78w to test the Shannon. The well was completed in April 1955 for 80 bbl. of oil per day after fracture. Both Bertagnole and Holden & Jarrett have steadily developed their properties since that time.

Other operators entered the play in 1955 and by the end of the year there were nine wells producing from the Shannon, all updip as close to the reserve as lease lines would allow. Production from these nine producing wells was not outstanding and ranged from 15 to 50 bbl. of oil per day with water cuts as high as 78%.

Mark J. Davis 1 Parsons, SW NE SW 26-38n-78w, was completed January 7, 1956, and touched off the rapid development in this area. The 1 Parsons was drilled about 150 ft. structurally downdip from the nearest poor producing well and was completed for about 110 bbl. of oil per day cut about 15% water.

There were 85 wells producing by the end of 1956 and 125 by the end of 1957. Seven wells have been completed so far in 1958 and there is now one cable-tool rig operating to fill in the few remaining proved locations.

TABLE 1—SURFACE FORMATIONS AT EAST TEAPOT

	Thickness (ft.)	Depth below top of Parkman (ft.)
Cretaceous—		
Parkman sandstone	655	
Upper Steele shale member	690	655
Sussex sandstone member	40	1,345
Middle Steele shale member	385	1,385
Shannon sandstone member	140	1,770
Lower Steele shale member	1,390	1,910
Niobrara shale	710	3,300
Frontier (incl. first Wall Creek, second Wall Creek, and third Wall Creek)	915	4,010
Mowry	240	4,935
Muddy and Thermopolis	150	5,175
Dakota and Lakota	85	5,335

Geology

The surface formations at East Teapot include the Upper Cretaceous Parkman and Steele shale. Table 1 lists these and other formations that have been penetrated in drilling at East Teapot (see Fig. 3).

Formations below the Lakota that have not been penetrated include the following: Jurassic Morrison and Sundance, 520 ft.; Triassic and Permian Chugwater and Goose Egg, 1,050 ft.; Pennsylvanian Tensleep, 175 ft.; Pennsylvanian Amsden, 270 ft.; Mississippian Madison, 225 ft.; Cambrian undifferentiated, 810 ft., and Precambrian.

The producing wells at East Teapot spudded in the upper Steele shale or in the Parkman sandstone that forms the "rimrock" on the eastern flank of the Teapot anticline.

Structure . . . East Teapot field is on the eastern flank of the Teapot Dome (Fig. 2) in the southwestern part of the Powder River basin. Numerous northeast-southwest normal adjustment faults extend across this area and are extensions of faults previously mapped on the apex of the main anticline. Strata dip approximately 11° to the east over most of the East Teapot field. The normal adjustment faults hade either north or south toward the apex of the Teapot Dome which is the expected relation in this type of fault pattern. The northernmost normal fault shown in Fig. 2 hades to the south, has a displacement of 200 ft., and is the northern limit of production from the Shannon.

Producing Formations

Fractured shale . . . Two wells are now producing from the fractured shale above the Wall Creek sandstone.

These wells have probably accounted for 180,000 bbl. of 37° to 41°-API oil since completion.

Seven wells have tested the fractured-shale possibilities at East Teapot; six of these were cable-tool wells and one was drilled with air. The possibilities for additional production from the fractured shale above the first Wall Creek are excellent, although no current activity is known.

Fractured-shale production occurs at depths ranging from 2,440 to 2,773 ft., but could produce anywhere within the interval between the base of the Shannon and the top of the first Wall Creek.

Shannon sandstone . . . Present target in the shallow-drilling campaign now has 132 wells producing and development is on 10 or 20-acre spacing. Production is limited to permeability developed in the "upper bench" (Fig. 4), although the "second bench" has had excellent shows of oil. No completions were ever successful in the second bench, and it is the writer's opinion that it is not capable of production within the present Shannon producing area by present producing techniques.

The Shannon is a coarse-grained glauconitic sandstone with varying shale interbeds. It is exposed on the surface north of the most northerly fault shown on the geological map (Fig. 2). Within the producing area, the top of the Shannon sand ranges from 805 to 1,764 ft. Wells must be stimulated with fracture techniques to be commercially productive.

Production data prior to January 1, 1954, include oil produced from the two fractured shale wells at East Teapot and the one fractured shale well at West Teapot. Data subsequent to January 1, 1954, include oil produced from the two fractured shale wells and from the Shannon sandstone (Table 2).

Wells in the Shannon have an initial production of 15 to 125 bbl. of oil per day, decline in 1 year to 12 to 80 bbl. per day, and decline in 2 years to 8 to 45 bbl. of oil per day.

TABLE 2—YEARLY PRODUCTION FROM EAST TEAPOT

Year	Bbl.	Year	Bbl.
1922		1940	5,814
1923		1941	6,411
1924		1942	5,588
1925	608	1943	4,962
1926	654	1944	4,749
1927	4,683	1945	4,724
1928	7,136	1946	3,872
1929	12,841	1947	4,644
1930	10,791	1948	3,356
1931	7,407	1949	3,037
1932	8,722	1950	2,518
1933	9,500	1951	5,824
1934	8,499	1952	8,673
1935	8,043	1953	8,752
1936	7,422	1954	9,730
1937	6,604	1955	26,735
1938	7,005	1956	409,634
1939	6,943	1957	710,760

"Low bottom-hole temperatures allow rapid paraffin buildup in the Shannon producing wells. Frequent hot-oil treatments or bottom-hole heaters help alleviate this problem."

Reserves

• **Fractured shale.** No detailed production figures are available to calculate the reserves of the two fractured shale wells, although they have both produced a total of 180,000 bbl. of oil.

• **Shannon.** There are 1,710 proved productive acres in the Shannon sandstone reservoir of East Teapot. Reservoir drive is primarily volumetric with a minor amount of water drive at the north end of the field.

This water drive is partly indigenous and partly from fractures into the lower part of the Shannon. An estimated 3,000 bbl. per acre can be recovered by primary-recovery methods.

There was, therefore, 5,130,000 bbl. of oil originally recoverable by primary methods in the Shannon. There had been 1,147,129 of 30° API oil produced to January 1, 1958. Therefore, 3,982,871 bbl. of oil remained as recoverable reserve by primary methods on January 1, 1958.

Drilling and Completion Practices

• **Fractured shale.** Operators drill and set protective casing completely through the Shannon. The pay zone is either drilled with cable tools or rotary using air. Oil shows are tested with the bailer.

Some operators complete the well with tubing in the open hole; others hang additional protection strings above the producing zone or hang slotted protection strings through the producing zone. Paraffin and shale cavings from up the hole tend to plug off the wells. As a result, these wells require cleaning out about once a year to maintain maximum production.

• **Shannon.** Customary practice is to set 15 to 60 ft. of surface casing and drill with rotary and oil-emulsion mud through the pay. Operators set 5½ or 7-in. casing through the pay, cementing with 25 to 100 sacks of regular cement. Radioactive log is run, and the pay zone is gunned or jet-perforated. The well is placed on the pump after a fracture treatment. An alternate method is to drill with cable tools to the top of the Shannon and into the Shannon a short distance. Operators then set casing on top of the pay, drill out, and fracture the well prior to putting it on the pump.

Low bottom-hole temperatures allow rapid paraffin buildup in the Shannon producing wells. Frequent hot-oil treatments or bottom-hole heaters help alleviate this problem.

At the present time there is a 6-mile, 4-in.-diameter pipeline that connects the Shannon producing area with the Sage Spring Creek line to Casper. This was completed in October 1957. Prior to the pipeline, the oil was trucked 15 miles to a pipeline station at Midwest, Wyo.

Additional Possibilities

• **Fractured shale above first Wall Creek.** Two wells producing from seven tests is about the average success ratio in other areas that produce from fractured shale. Teapot Dome and Salt Creek (over 4,000,000 bbl. from fractured shale) completed wells from fractured shale if they produced over 25 bbl. of oil per day. The possibilities of additional wells from fractured shale should be considered proven.

• **Muddy.** The last Navy test in the reserve found the Muddy productive about a mile and a quarter west of East Teapot field. The Muddy produced in one well at North Sage Spring Creek. Production from the Muddy results from variation in the sandstone development and it should be considered untested in the East Teapot field as only three wells have drilled to it.

• **Dakota.** The Dakota in this area is probably a channel sandstone and present nearby production is not confined to structural highs. Only three wells have tested the Dakota at East Teapot (Fig. 3). There is certainly room for additional production of the type found less than 2 miles south of the present Shannon production at East Teapot.

Other formations have possibilities for production at East Teapot, but the above three are the best shots at this time. This is a flank play in an area that has already had considerable production, and merits serious consideration for additional production.

In Texas . . .

Upton County deep tests extend Wolfcamp oil

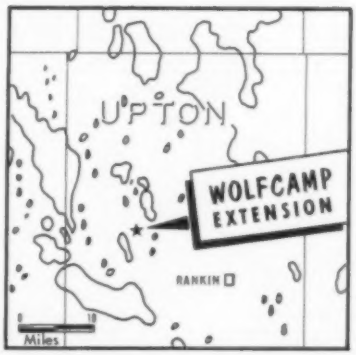
HUNT OIL CO. 1-82-E Amacker, 10 miles northwest of Rankin in western Upton County, was dry in the Devonian but has been plugged back and completed as a flowing Wolfcamp discovery, or extension.

Location in Section 82, Block Y, GC&SF Survey, is nearly 2 miles west of nearest production in the Amacker-Tippett multipay field, and 3 miles northwest of new Wolfcamp production at Amacker-Tippett, South field.

Final potential on the Hunt well was 522.5 bbl. of 45°-gravity oil a day, based on a 12-hour flow test of 261.25 bbl. through 16/64-in. choke. Perforations were between 9,080-90 ft. Gas-oil ratio was 1,485:1.

No. 1-82 Amacker was drilled to total depth of 12,100 ft., and reported shows of gas, oil and salt water on a test at 11,938-12,100 ft.

Gulf Oil Corp. 498 McElroy, Section 187, Block F, CCSD&RGNG Survey, deep exploration 3½ miles northeast of Crane, but in Upton County, reported shows of oil and gas in the Devonian. A 2-hour drill-stem test between 11,060-11,120 ft. recovered 150 ft. of oil and gas-cut mud, plus 4,500 ft. of gas. Drilling continued on a 13,200-ft. contract.



HUNT OIL CO. 1-82 Amacker is between King Mountain and Amacker-Tippett fields in western Upton County. Although it is called an extension well, its distance from nearby production would classify it as a discovery.

Nearest Devonian production is approximately 1 mile to the southeast in Adams field, which also produces from the Silurian and the Ellenburger.

Gulf's well is a shallow producing area of McElroy field. Earlier it recovered oil on test in the Pennsylvanian at 8,084-8,176 ft., and flowed 74 bbl. of oil in 6 hours at 9,016-9,108 ft., also Pennsylvanian.

. . . and limestone pays in Coke County

LION OIL CO., division of Monsanto Chemical Co., has completed a big Strawn limestone strike in northwestern Coke County, 5 miles south of Silver.

The well is Lion Oil 1 Sadie, Section 12, Winfield Scott Survey. Completion potential was 915.84 bbl. of 42°-gravity oil a day, based on a 3-hour test through 24/64-in. choke, from perforations at 6,390-6,409 ft. Flowing tubing pressure was 550 psi. Gas-oil ratio was 176:1.

Location of the new opener is approximately 2 miles south of Bloodworth pool, (two wells around 5,700 ft.), and 5 miles west of the I.A.B. multipay field.

Monsanto has full ownership on the 40-acre tract on which the discovery is located, plus half-interest leases on approximately 1,200 acres nearby.

In East New Mexico San Miguel County wildcat dry at 7,018 ft.

Capital Seaboard Oil Co. 1 Hampton Ranch, San Miguel County deep test, has halted drilling at total depth of 7,018 ft., with no shows reported. Formation tops have not been released.

Location in NW NW 9-13n-30e, is 14 miles northwest of Tucumcari and about 12 miles northeast of Miami Petroleum Co.'s dry test.

New Mexico site of two completions

TWO EXCELLENT producers in the multipay Justis field, Lea County, New Mexico, were recently completed by Tidewater Oil Co.

The No. 11 A. B. Coats "C" was dually completed in the Drinkard and Fusselman zones. After perforating the Drinkard from 5,890-5,930 ft., the well was completed with an initial potential of 510 bbl. of oil per day flowing through a ¼-in. choke. The Fusselman was perforated 6,793-6,898 ft. with initial potential produced 120 bbl. of oil per day flowing through a 14/64-in. choke. The well is located in Section 24-25s-37e.

The 13 A. B. Coates "C" was completed in the Ellenburger formation for an initial potential of 346 bbl. of oil per day flowing through 18/64-in. choke. The well was perforated 8,160-8,205 ft. Location of the well is in Section 24-25s-37e.

Texas' Cage Ranch gets first oil

CAGE RANCH GAS FIELD, south of Falfurrias, in northern Brooks County, South Texas, is getting its first oil production.

Its discovery is by Associated Oil & Gas Co. in its 5-B Cage, a well originally completed in 1956 as a gas-condensate producer.

The well, reworked and reperforated in its original 7,200-ft. gas-condensate zone, flowed 33 bbl. of clean 46.1°-gravity oil during tests through ⅛-in. choke.

Reperforations are at 7,155-61 ft. Previous perforations were at 7,156-66 ft.

New book for oil finders

"Earth For the Layman," by Mark W. Pangborn, Jr., is a 64-page paperbound volume giving an annotated listing of more than 1,400 popular books on geology and related subjects.

The book can be ordered from the American Geological Institute, 2101 Constitution Avenue, NW, Washington 25, D. C.

NEXT WEEK

ABC's of Geochemistry

Reserves in East Calgary field boosted by discoveries

BANFF OIL, LTD., has extended the Mississippian (Elkton) and D1 Devonian gas-productive zones in East Calgary field another 3 miles by indicating success in both at a recent step-out driller in the region.

Actually, East Calgary field has three potential gas-bearing structures, namely: Basal Quartz sand at a depth of about 7,300 ft.; Elkton member of Mississippian about 7,400 ft. and D1 zone at about 8,500 ft. in depth. The Basal Quartz, however, on this recently indicated success was not drill-stem-tested and it is not known if production is contained in it or not, although possibilities are very slim.

East Calgary gas field lies to the east and northeast of the city of Calgary and with the success of the new venture the length of it has now been extended to almost 12 miles. There are now eight gas completions in the region, six of which are productive in the D1 horizon, two contain Basal Quartz production and three are now successful in the Mississippian (Elkton).

A recent report to the Oil and Conservation Board by the principal developer in the region, Jefferson Lake Sulphur Co., placed the reserves of natural gas in the D1 structure at 356 billion cubic feet and the estimated total possible productive area at 69,500 acres. However, that report did not include the Banff success. Basal Quartz reserves have been placed in the neighborhood of 24¾ billion cubic feet and Elkton reserves (again excluding the Banff hole) are estimated at 64¾ billion.

The Banff well, 11-10-26-29, Calgary North, on LSD 11, 10-26-29w4, lies 3 miles due north of the original Elkton discovery hole in the region, Jefferson Lake C.P.R., 27-6, North Calgary. That latter well found 103 ft. of porosity in the Elkton while the Banff-operated venture encountered 108 ft.

Drill-stem test conducted in the Elkton horizon had gassed at the rate of 6,760 M.c.f.d. That gas flow was accompanied by a heavy spary of distillate throughout which is not unlike the discovery hole 3 miles south, as it also gave up distillate on production tests.

Only the one test was run in the horizon but production casing has been set on the well and it is understood that further evaluations are currently being carried out. Test in D1 horizon, taking in a 38-ft. interval around the 8,800-ft. level gassed at maximum 1 M.M.c.f.d. and gave up a recovery of gas-cut mud. Banff stated that although the Mississippian would be production-tested immediately, further tests in the Devonian sector would be deferred until a later date.

Associated with the operator in this drilling venture are Canada Oil Lands, Ltd., Britalta Petroleums, Ltd., and some undisclosed individuals. As the team can earn additional acreage in region by drilling a further well it is expected that more activity will be announced shortly.

Oregon's Prineville test drilling

Sunray Mid-Continent Oil Co., operator on the Bear Creek Unit, was drilling ahead below 4,200 ft. on the first test of this lease near Prineville in Crook County.

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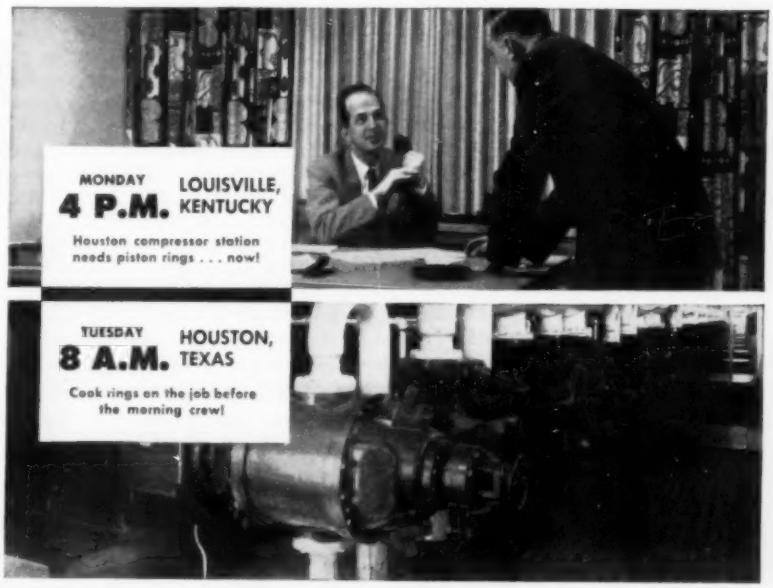

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California drillers bat .600 in North Tejon operations

WITH A SCORE of three discoveries out of five completions thus far, both Reserve Oil & Gas Co. and Richfield Oil Corp. have stepped up their operations in the North Tejon field of Kern County.

A recent tally looks like this:

... Reserve, discoverer of the field, was drilling ahead on two extension tests associated with the Butler-Wehr region, scene of the original discovery. One, 382-19 W-T, was coring at 11,526 ft. about ¼ mile southeast of the discovery well and offsetting to the south the two other producers in the discovery area.

Another, 348-18 B-W, was drilling ahead below 5,844 ft. at a site about ¼ mile west of the discovery well and almost midway between the Butler-Wehr area of the field and Richfield's recently discovered portion of the field about 1 mile west of the Butler-Wehr region.

Reserve's two other drilling projects are 308-18 W-T offsetting Richfield's discovery, and 385-19 R-S-T located nearly ½ mile south of the Butler-Wehr area. Reserve 308-18 W-T was drilling below 8,982 ft. while 385-19 R-S-T was rigging up.

... Richfield had two tests under way in its area of the field. One, 61-24 KCL-I, was drilling below 9,340 ft. on a site two locations west of its discovery well and the other was drilling below 8,767 ft. at a site two locations south of the discovery.

All three discoveries in the field are in lower Miocene Vedder sands, but at three different depths. The North Tejon field discovery is producing from a Vedder sand at 11,850-12,207 ft. The field's deepest test to date, 361-19 W-T, which was plugged back from 14,488 ft., was completed in a Z-4 Vedder pool at 11,998-12,127 ft. Richfield's Vedder discovery 1 mile to the west of Reserve's two finds was completed in a Vedder interval at 9,165-9,557 ft.

About 7 miles west of North Tejon field, Shell Oil Co. tapped a new shallow pool in the Pleito Ranch area, 2 miles west of Wheeler Ridge field. Shell's new find is located ¼ mile northwest of their Pleito Ranch new field discovery well of last September. The new discovery, 27-25 KCL, is perforated at 9,297-9,422 ft. and 9,450-9,500 ft. Initial production was 233 bbl. daily of 23.9°-gravity crude through a 20/64-in. choke.

About 3½ miles northwest of Shell's Pleito Ranch activity, Richfield appeared headed for a significant discovery in the San Emidio Nose section of Kern County. Richfield reportedly found a new sand back up the hole which would make it a new field discovery if successfully completed. The operator was drilling out cement at 11,599 ft. after setting casing at 11,452 ft. prior to drilling deeper.

California highlights . . . Intex Oil Co.'s latest development well in the shallow Tapia field in northern Los Angeles County blew out at 732 ft. spewing gas and mud 300 ft. into the air for several hours before it was shut off . . . General Petroleum Corp. plugged and abandoned its gas test in the Delta region of Contra Costa County at 5,142 ft. . . . E. A. Bender, Bakersfield operator, has staked a location for a 6,500-ft. gas test 3 miles north of Orland near Highway 99 in Tehama County in northern California. The drill site is about 7 miles

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southwest of the South Dome gas field. . . . Cann and Wallis, operators, had to plug and abandon their 3,033-ft. wildcat in the Half Moon Bay region of San Mateo County when sloughing problems became too severe. Two formation tests indicated good pay possibilities and the operators plan to drill another well nearby in about 2 weeks.

Montana finally completes well in Disturbed Belt

THE FIRST commercial producer in Montana's Disturbed belt was officially completed last week. Northern Natural Gas Producing Co. completed 1 Blackleaf-Federal-A, NW SE NE 13-26n-9w, Teton County, for 6,293 M.c.f. of gas daily from perforations in the Mississippian at 3,794-3,806 and 3,816-30 ft. The gas flow was through 5/8-in. choke.

Montana's Disturbed belt has been the scene of several important wildcats in the past few years. Many had shows, but none was ever completed successfully. The belt is an extension of Alberta's famed and prolific Foothills belt.

Northern Natural's successful completion of the Montana wildcat throws the door open to an entirely new province for the Rocky Mountains. With a foot in the door, oil and gas hunters can be expected to give this region real going over in the coming months.

With fields like Waterton Park, Canada's largest gas reserve, just a few miles to the northwest in the same belt, Montana's Disturbed belt could easily become one of the most interesting wildcatting grounds in the country very soon.

Michigan shows Traverse prospect

A GOOD TRAVERSE reef prospect further boosted Michigan's outlook as J. V. Wicklund, Jr., 1 Murphy, SE NW SE 2-14n-5w, Deerfield Township, Isabella County, carried 1,000 ft. oil in 36 hours from 3,187-91-ft. pay.

Pay zone was drilled before production string had been set with wildcat originally set up to drill Dundee at 3,800 ft. Well will be acidized at present point for production test.

The 2-year-old Deerfield block, located 4 miles east of a 1,300-ft. Stray sand gas field, originally was taken by Union Development Co. and this spring farmed to Wicklund.

Here's action . . .

In New Mexico . . .

A NEW Devonian discovery in Lea County, New Mexico, has been completed by Sinclair Oil & Gas Co.

The strike is Sinclair's 2 State Lea 401, NE NE 21-18s-35e, 1 mile northwest of other Devonian production and ¼ mile west of Sinclair's recent Bone Spring discovery.

The pool opener flowed 200 bbl. of 43°-gravity oil in 11 hours through a 12/64-in. choke from Devonian perforations at 11,726-56 ft. Gas-oil ratio was 88:1.

In Kentucky . . .

IN BREATHITT COUNTY and located on Shoulderblade Creek, Big Buck Development Corp. has completed its extension well 1 Dan Griffith as a Corniferous lime producer with an initial potential of 60 bbl. daily.

Top of lime was found at 1,787 ft. and test bottomed at 1,848 ft. A small producer—25 bbl. before shooting—the well responded to a 160-qt. shot. Two additional wells are being drilled on the lease.

In Ohio . . .

A FURTHER east extension of the gas field south of Conneaut in Monroe Township, Ashtabula County, Ohio, was announced by the operator, R. McConnell.

The 1 W. Warpulo, Lot 7, logged Clinton sand at 3,104-29 ft. and gaged 2,900 M.c.f. after fracture.

And Alaska

TWO FISH JOBS and the territory's deepest test to date highlight drilling activity in Alaska.

The two fishing jobs belonged to Anchorage Gas & Development Co. and Humble Oil & Refining Co.

Anchorage was fishing parted drill pipe at 4,670 ft. on 3 Rosetta in the Susitna flats region.

Humble was preparing to sidetrack stuck drill collars in its 1 Bear Creek Unit at 10,867 ft. This is in the Widebay-Kanatak area on the Alaska Peninsula.

On the southern Kenai Peninsula, Standard Oil Co. of California was drilling below 13,171 ft. on its Deep Creek Unit wildcat near Ninilchik. This test is nearing critical depth as the rig being used is rated at only 14,000 ft.

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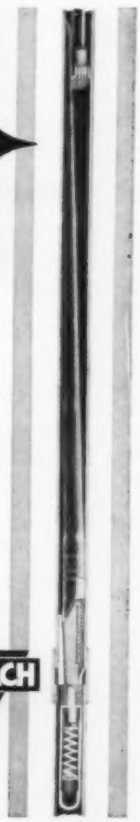

You set your Kinzbach Whipstock at desired depth and position with absolute confidence of positive grip. Trigger assures that whipstock will be set so window will always be in only one joint of pipe. Concave section pivots on one direction hinge above slip section so upper lip always lies against pipe for safe passage of working tools; cannot be hinged into obstructing position.

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Texas, Oklahoma show activity . . .

In Lipscomb County . . .

NEW Tonkawa-Pennsylvanian gas-distillate production was opened in southwestern Lipscomb County, Texas Panhandle.

El Paso Natural Gas Co. 1 Kellin, Section 112, Block 43, H&TC Survey, flowed 13,500 M.c.f. of gas and 13 bbl. distillate per hour from perforations at 7,240-60 ft. This new pool-opener is 8 miles northwest of Canadian, Tex.

In Baylor County . .

INITIAL POTENTIAL has been reported for Griggs Oil Corp. 1 J. R. Parkey, Jr., recently completed Mississippian limestone discovery in eastern Baylor County.

On test from open-hole section at 5,376-88 ft., the well flowed 248 bbl. of 43°-gravity oil in 4 hours through 32/64-in. choke, to give it a calculated daily rate of 1,487 bbl. Flowing tubing pressure was 420 psi. Gas-oil ratio was 200:1.

Location in Section 10, BBB&C Survey, is about 1 mile from 4,900-ft. production in Parkey field, and 3½ miles southeast of nearest Mississippian oil in Freeport field.

Potential at Grayson discovery . . . John M. Hamilton 1 Nora B. Wood, Oil Creek sand strike east of Whitesboro in Grayson County, has been completed for 684 bbl. of oil a day.

Potential was based on an actual flow of 162 bbl. of 35°-gravity oil in 6 hours, through 10/64-in. choke, from perforations at 6,149-58 ft.

Location is on a 40-acre lease in the T. W. Randolph Survey, A-1524, 3 miles east of Whitesboro.

In Love County . . .

SOUTHERN OKLAHOMA'S Southeast Marietta field, an Ordovician producer in Love County, was expanded last week by Pasotex Petroleum Corp.

The 1 J. C. Brannan, NW NE NW 30-7s-3e, flowed 20 M.M.c.f. of gas per day and 91 bbl. distillate per million from deep Oil Creek sand perforations at 13,940-14,032 ft.

The discovery well in this area was the 1 Brannan in NW NE SE 30-7s-3e. It flowed 8,100 M.c.f. of gas per day from perforations at 13,948-14,020 ft.

In Harper County . . .

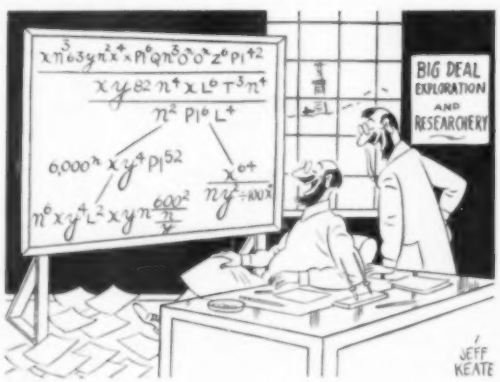
NEW OIL PRODUCTION was opened on the west side of big Laverne gas district in northwestern Oklahoma's Harper County.

Shell Oil Co. is testing a Chester-Mississippian oil discovery at 1-27 Robertson, C SE NW 27-26n-26w. The well flowed 287 bbl. of oil and 135 bbl. of water in 24 hours on 1-in. choke after being shut in to run tubing and packer. Perforations were at 7,443-49 ft.

And Pushmataha

A WILDCAT deep in the southeastern corner of Oklahoma, an area of mountains and no production, reported a gas show last week. This Ouachita Mountain country test is Sikes-Burckhalter and Caulkins Oil Co. 1 Denton-Perrin, SW SE SE 25-2s-15e, Pushmataha County.

Gas showed in 2 minutes with recovery of 30 ft. of gas-cut mud reported on a 1-hour opening at 2,331-65 ft. Discovery of gas in this area would open first production in the county.



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Nebraska shows life

In Sernquist field . . .

INCREASED ACTIVITY in western Nebraska's Sernquist field area has been stimulated by the completion of 1 Johnson, a southwest extension well brought in by Bruce Petroleum Co. and Tejas Oil & Gas Co. of Houston.

Located 2,310 ft. southwest of previous production, 1 Johnson was completed at 456 bbl. per day of 40°-gravity oil, after several days' testing. Perforations were at 5,752.5-55.5 ft., the top 3 ft. of the "J" sand. The Johnson is the third producer in the field.

Discovered in June 1956, Sernquist field is in the Denver basin. The field is in Kimball County on Nebraska's western border, on a line due east from Cheyenne, Wyo. Magnolia Petroleum Co. operates the two other producers in the field.

And Hitchcock County

CLOSE ON THE HEELS of Phillips Petroleum Co.'s recent 1 Llanos Pennsylvanian discovery in northwestern Kansas, Skelly Oil Co. reports a possible discovery at its 1 Jankovits in SW SW NW 32-1n-31w, Hitchcock County, Nebraska.

Skelly is running pipe at the well which is 22 miles south of Barger field, nearest production. Recovery on a drill-stem test in Lansing-Kansas City Pennsylvanian at 4,099-4,133 ft. got 10 ft. of oil-cut mud, 120 ft. of oil, and 60 ft. of oil and water-cut mud.

This newest discovery prospect in the eastern flank region of the Las Animas arch country is about 50 miles northeast of Phillips big well in Sherman County, Kansas.

Indiana, Illinois share new success

EXPLORATORY SUCCESS is reported in the Illinois basin, both in Indiana and in Illinois.

Kennard Oil Co.-Lohmann-Johnson Drilling Co. opened a new pool at 1 Albert Aldrich, SW SE SE 34-5s-14w, Posey County, Indiana. The upper Tar Springs-Mississippian well had a recovery of 60 ft. gas, 2,100 ft. of clean oil on drill-stem test at 2,313-26 ft. Location of this strike is 2 miles south of big Mink Island field.

• In Clay County, Indiana, Kenneth Kuhn and Donald Jones have a new Devonian discovery in the area 10 miles southeast of Terre Haute, NE SE SW 8-11n-7w. The 1 Ira Besore pumped 130 bbl. of oil daily from perforations at 1,534-39 and 1,544-49 ft.

• In White County, Illinois, Southern Triangle Oil Co. completed its 1 Mertie A. Postal discovery in NW SW SW 22-3s-10e, 4 miles west of Grayville, on pump for 100 bbl. per day, natural. Production is from the McClosky-Mississippian lime at 3,200-08 ft.

New names for North Dakota

THE STATE nomenclature committee of North Dakota announces the names of the following new fields in the state.

. . . **North Fork field.** Discovered by Amerada Petroleum Corp. at 1 H. H. Shelvik, NE SW 35-150n-97w, McKenzie County. Completed March 7.

. . . **Writing Rock field.** Discovered by Kerr-McGee Oil Industries, Inc. at 1 Arlot Johnson, NE NW 35-162n-101w, Divide County. Completed in Red River April 21.

. . . **Pershing field.** Discovered by Amerada at 1 J. Ljaadal, NE NW 29-150n-96w, McKenzie County. Completed April 8.

. . . **Wiley field.** Discovered by

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If output increases, add units; as it declines, remove units.

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Cardinal Drilling Co. et al at 1 George S. Stratton, SW SE 24-161n-82w, Bottineau County. Completed April 14.

. . . Short Creek field. Discovered by Northwest Drilling Co. at 1 Bonnie "B," SE SE 36-164n-93w, Burke County. Completed February 12.

. . . South Rival field. Discovered by Northern Pump Co. at 1 W. A. Bywater, NE SW 34-163n-92w, Burke County. Completed March 6.

. . . Roth field. Discovered by Great American Exploration, Inc., at 1 Howard Nordmark, SW SE 30-163n-78w, Bottineau County. Completed April 25.

Here's a California map . . .

A NEW hand-colored map of the oil and gas fields of California, including counties, pipelines, cities, township, and range lines, is available from L. J. Wilson Map Co., Box 6277, Houston 6.

Scale on this useful map is 1 in. equals 16 miles.

A Permian basin map . . .

This wall map has been revised to January 1, 1958, and covers the Permian basin of West Texas and Southeast New Mexico.

It shows outlines of pools, pool names, county outlines, county seats, and major roads. Scale is 1 in. to 32,000 ft. Over-all size is approximately 52 by 65 in. An index listing all pools shown on the map gives the producing horizon, top of pay, and date the pool was discovered.

For information, write Midland Map Co., Box 1811, Midland, Tex.

And a pipeline map of British Columbia

Nickle Map Service, Ltd., of Calgary announces publication of its new pipeline and field map of British Columbia.

The company has similar maps available in Alberta and Saskatchewan. With the inclusion of the coast province, these maps can be joined to facilitate a map of the major exploration area of West Canada.

HOW TO STOP CORROSION OF OIL WELL CASING

The external corrosion of oil and gas well casing is a major headache to operators in many areas. It causes leaks, necessitates repairs, and can even reduce a well's deliverability.

Now, wells in most fields can be protected against external corrosion cathodically. Magnesium anodes or rectifiers are used to project current onto the casing to stop corrosion.

CSI engineers recently installed rectifier systems on 25 oil wells in Central Texas for a major oil company. They ran current requirement surveys; and furnished all necessary engineering, labor, materials, ditching machines, earth augers and other equipment. The turnkey job cost only about $375 per well.

Let CSI engineers help you. Call or write today for engineering and installation services or quality materials. Estimates or quotations without obligation. Ask for free copies of the new CSI reports on "Hot Spot Protection" and "Galvomag Anodes."

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Drill probes under Mississippi River

AN EASTERN Louisiana wildcat will seek production underneath the Mississippi River opposite Concordia Parish. This interesting test is Jett Drilling Co., Inc. A-1 State of Louisiana, ¾ mile southeast of Fairview field. It will go to 7,000 ft. for a look at Wilcox possibilities.

Surface location of this river wildcat is in the NWc 12-4n-9e; go south 63°, 35' east 12,191 ft. to location in accretion to 13-4n-9e where Sinclair drilled the 1 State-Concordia 1458.

Wyoming adds to Big Horn basin

MADISON-MISSISSIPPIAN production was officially added to Grass Creek field, a Tensleep-Pennsylvanian producer in Hot Springs County, Big Horn basin, Wyoming.

Ohio Oil Co. 1 pre-Tensleep unit, NE SW SW 18-46n-98w, pumped 344 bbl. of oil and 34 bbl. of water per day from perforations at 4,439-4,580 ft. This discovery is on a unitized block destined for pre-Tensleep drilling. Pan American Petroleum Corp. has a 31% working interest in the new unit.

Ohio's new-pay discovery is the first well at Grass Creek to dig below the Tensleep. The operator also found oil in the Darwin at 4,357-80 ft.

Tube-Turn fittings are typical of the line of quality equipment stocked and distributed through National's 130 stores.

You say you want complete stocks?

If you've had problems getting stock fittings and parts in a hurry, National Supply can solve them. Stop in and see the complete stocks of Tube-Turn fittings and other quality products we maintain . . . and take your time looking around. The doors and gates to our store, warehouse, equipment yard or pump shop are always open, and it will pay you to walk in and get better acquainted with our store people and the stocks they offer. We've built counters in the fronts of our stores for convenience—not as barriers.

As you walk back and around, you'll see ample stocks of products like these Tube-Turn fittings, Rockwell-Nordstrom valves, Ajax Engines, Oilmaster pumps and Link-Belt chain. The list of outstanding equipment is a long one, and we're pleased to be associated with every name on it.

More important than complete stocks is the fact that this is equipment you can use to operate profitably. Having it ready for you, when and where you need it, is our business, and we have 70 years of experience in it.

The next time you stop in a National Supply Store, shop behind the counter, too.

NATIONAL

"Extras" and "Special Features" in other units are STANDARDS in National Pumpers!

EXAMPLE: ACCURATE COUNTERBALANCING Because of the geometric and concentric design of cranks and counterweights, National Pumpers allow the best counterbalance—at a leading or lagging condition *as well as at mid-stroke*—you can obtain today. Counterweights can be quickly and safely adjusted by one man, in a method that's far superior to slab adding or subtracting systems.

EXAMPLE: GEAR REDUCER DESIGN—National gear reducers meet or exceed all API specs, and can be rotated in either direction. This permits more latitude on prime mover placement, and extends the life of the reduction unit. Other units without proper geometric design or with one-direction lube systems can't use reverse rotation for these benefits.

EXAMPLE: GROUND LEVEL LUBRICATION—This is a desirable *standard* safety and convenience feature in all National Pumpers for which you pay no extra charge.

EXAMPLE: ARC HANGER DESIGN—National's arc hanger has a hinge which allows you to fold it back for unhindered well servicing. It also has self-adjusting features which prevent side loading, polish rod bending and excessive wear on stuffing box packing. Many other pumpers lack these practical, economical features.

EXAMPLE: CRANKS—The gear reducer is placed on sub-base on crank-counterweighted National models. This places it at a height which prevents the weights from traveling below the unit base, and thus eliminates side pit digging for proper clearance. Split cranks are used for easy field removal and replacement—no solid cranks to cause extended down time, transportation and machine shop expenses.

EXAMPLE: BEARINGS—National provides the best frictionless bearings for the loads and motions involved in pumping unit operation—straight or tapered style roller bearings on all fully rotating shafts, and proven needle type bearings at points where limited or oscillating motions are present. These bearing selections mean minimum horsepower losses through the unit and greatly increased bearing life.

EXAMPLE: DUST SEALS—National Pumpers have dust excluders on all bearings to improve the life of oil seals and bearings. Dust seals on shafts rotate with, but do not touch, the shafts, and are extremely efficient.

EXAMPLE: OVERALL STABILITY—National Pumpers have wide spacing of the samson post's four legs plus cross bracing. This makes them far less susceptible to twisting or stressing due to improper unit setting than units of small leg spread, three-leg construction or without cross bracing.

There are many more specific examples which prove that the best pumper investment for lowest operating costs is National. The National man in your area will tell and show them to you any day you choose.

National Pumpers are available in 22 standard API sizes, plus several long stroke and portable variations.

More National equipment for profitable production on next page

Precision manufacturing operations and painstaking inspection methods insure the traditional quality in every finished National Rod shipped to the field.

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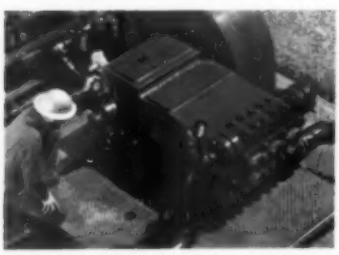
2. **QUALITY-CONTROLLED**—from laboratory testing of sucker rod steels to final shipment inspections—to give you the ultimate in uniformity, dependability and economy.
3. **PRECISION-MANUFACTURED** on specially-developed machines—in accordance with the strictest specifications in the industry.

National Rods reach you in factory condition, too, whether you get them from National Supply Store stocks or directly from the mill. National's careful methods for stacking, handling, shipping and field storage have been proved by hundreds of shipments to all parts of the world.

Of course, National has a rod grade for every well condition—normal, mildly corrosive, heavy corrosive or sulphide wells. National Hollow Sucker Rods and Plastic-Coated Rods are also available for special conditions.

From any standpoint, the choice of a National Sucker Rod string means low-cost sucker rod service. You'll find it worthwhile to review your rods needs with the National Supply field man in your area.



National Triplex Pumps are reliable on a host of oilfield pumping jobs including waterflooding, salt water disposals, formation fracturing, and as power-oil sources for subsurface hydraulic pumps.

National Wellhead Equipment features interchangeable units which provide many combinations for your specific size, capacity and type needs. Ease of assembly and pre-tested safety are two of its outstanding advantages.

National Plunger Lift can be the best production method for certain types of wells. It uses formation gas or injected gas for operation, has low initial and service costs. Equipment is also available for gas well operation to remove liquids and maintain a uniform and increased flow rate of gas.

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Successful Wildcats

BRITISH COLUMBIA

Sinclair B5-1 Canadian Atlantic, Unit 53, Zone D 94-B-9. Indicated gas discovery. TD 8-908 ft.

CALIFORNIA

Kern County: Kern Oil of California, Ltd., 46 Winters, NE SW 13-30s-28e, 90 BOPD, 10 BOPD net crude, 32° gravity, perfs. 6,975-77 ft., 6,978-96 ft., 7,021-33 ft., TD 7,450 ft. (New pool discovery on the north edge of the main area of Mountain View field.)

Shell Oil Co. 27-25 KCL, SW SW 25-11n-21w, 258 BOPD, 22.7° gravity, 20/64-in. choke, 0.2% cut, perfs. 9,297-9,422 ft., 9,450-9,500 ft., TD 10,222 ft. (Shallower pool discovery in Pleito Ranch field.)

Kern County: Reserve Oil and Gas Co., 361-19 "W-T", NW NE 19-11n 19w, 878 BOPD, 34.5° gravity, 24/64-in. choke, 0.3% cut, perfs. 11,998-12,127 ft. TD 14,488 ft. (Deeper Z-4 Vedder zone pool discovery in North Tejon field).

SOUTH LOUISIANA

Allen Parish: Beck Oil Co. 1-A Industrial, 36-6s-7w. IP 160 BOPD, 7/64-in., 43°, GOR 1,594 cu. ft. per barrel, TP 4,800 psi., perfs. 10,360-64 ft. TD 10,000 ft. New pay in Reeves field.)

St. Charles Parish: Russell Maguire 1 Elfer, 5-13s-8e (2 miles northeast of Luling field). IP 4,000 M.c.f. daily, 5 BC per M.M.c.f., ¼-in., TP 4,340 psi., perfs. 9,049-53 ft. TD 10,525 ft. (New field.)

TEXAS GULF COAST

Calhoun County. Layton Brown Drilling Co. et al 1 Sells, Sam Houston Sur. (2 miles northwest of Carancahua). Absolute open-flow potential 12,300 M.c.f. daily, GLR 28.6 M.c.f. per barrel, 63.4°, shut-in TP 2,761 psi., perfs. 7,680-88 ft. (Frio). TD 8,730 ft. (New field.)

Colorado County: Robert Mosbacher et al 1 Kehrer et al, 1&GN Sur. 13, A-319 (5 miles west of Garwood). Absolute open-flow potential 10,500 M.c.f. daily, GLR 79,931 cu. ft. per barrel, 52.7°, shut-in TP 2-298 psi., perfs. 6,608-18 ft. (Yegua). TD 10,520 ft. (New field—Easter.)

Jefferson County: Cyprus Oil Co. 1 Edwards, T&NO Sur. 31, A-222 (5 miles north of Winnie). Absolute open-flow potential 33,000 M.c.f. daily, GLR 48,450 cu. ft. per barrel, 56°, shut-in TP 3,000 psi., perfs. 9,620-26 ft. (Nodosaria). TD 10,248 ft. (Nearest reservoir in South Bauer Ranch area.)

Deep South Oil Co. of Texas 1 Aldridge. W. H. Aldridge Sur., A-813 (2 miles west of Fannett and 1 mile northwest of Marrs McLean field). IP 152 BOPD, ¼-in., 35.3°, GOR 650 cu. ft. per barrel, TP 210 psi., perfs. 9,759-62 ft. TD 11,052 ft. (New oil reservoir.)

Kleberg County: John B. Hawley 1 Sexaurer, Lot 11, Sec. 41, Kleberg Town & Improvement Subd. Absolute open-flow potential 12,800 M.c.f. daily. GLR 18.6 M.c.f. per barrel, 62.9°, shut-in TP 2,448 psi., perfs. 7,062-70 ft. (Frio-Ricardo sand). TD 8,719 ft. (New pay and extension for Ricardo field.)

Katz Oil Co. 1-A Johnson, Lot 14, Sec. 30, Kleberg Town & Improvement Co. Subd. (3 miles southeast of Kingsville). IP 120.86 BOPD, 11/64-in., 32.4°, GOR 675 cu. ft. per barrel, perfs. 7,522½-26½ ft. (Frio). TD 7,911 ft. (New pay in North Ricardo field.)

John B. Hawley 1 Sellers et al, Sec. 37, Kleberg Town & Improvement Co. Subd. IP BOPD, 5/32-in., 41°, GOR 900 cu. ft. per barrel, TP 890 psi., perfs. 5,714-17 ft. (Frio). TD 6,125 ft. (New pay in Ricardo field.)

Live Oak County: Argo Oil Corp. et al 1 Braslau et al, Lot 206, Blk. A, George W. West Ranch Subd. (2 miles southwest of George West). Absolute open-flow potential 72,000 M.c.f. daily, GLR 66.7 M.c.f. per barrel, 52.8°, shut-in TP 2,918 psi., perfs. 7,759-69 ft. (Wilcox-Slick sand), and 15,000 M.c.f. daily, GLR 42 M.c.f. per barrel, shut-in TP 5,400 ft., perfs. 8,814-26 ft. (Wilcox-Lower Lyne sand). TD 10,100 ft. (New field.)

W. B. Cleary, Inc., and James H. Helland 1 Agnes Cranz Estate, Blk. 4, Refugio County School Land Sur., A-399. Absolute open-flow potential 875 M.c.f. daily, dry gas, shut-in TP 1,205 psi., perfs. 2,910-20 ft. (Frio). TD 4,036 ft. (New pay in Southwest Sliva area.)

A. A. (Bus) Moore 1 Jack Brown, Sr., John McMullen Sur., A-30 (7 miles northwest of Mathis). Absolute open-flow potential 2,750 M.c.f. daily, dry gas, shut-in TP 1.427 psi., perfs. 4,072½-76½ ft. (Vicksburg). TD 4,175 ft. (New field.)

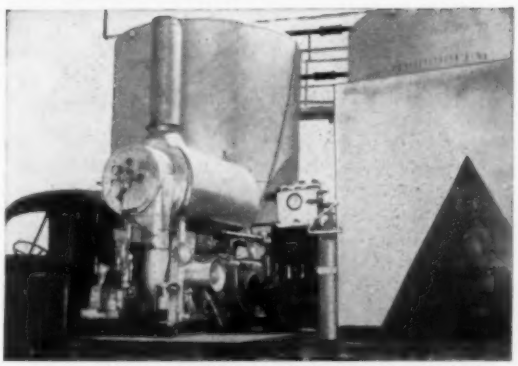
Kirkwood & Morgan. Inc., 1 Melton, S½ Farm Tract 3943, Sec. 97, Charles F. Simmons Subd. (1½ miles northeast of Texam field). Absolute open-flow potential 1,810 M.c.f. daily, GLR 91.5 M.c.f. per barrel, 57.1°, shut-in TP 2,076 psi., perfs. 6,893½-6,900½ ft. (Wilcox-Slick sand). TD 7,500 ft. (New field—House.)

Versatile

WISCONSIN-POWERED

"Texheater"

gets around in the Oil Fields



This model 25M Texsteam Texheater is in service in the Sherman, Texas, pool. It is manufactured by The Texsteam Corporation, Houston, Texas.

WIDELY used in the oil fields, this versatile heating unit has many applications . . . where quick, sustained heat is required. It is extensively employed to heat oil that is emulsified with water so that the added chemical will be immediately effective. It is also used for heating oil that has a tendency to deposit amorphous paraffin and thus clog up pipelines and connections.

A V-type 4-cylinder Wisconsin Heavy-Duty Air-Cooled Engine provides the dependable power required for operating the compressor that atomizes the fuel oil for heating, as well as circulating the oil or fluid that is being heated or treated. The Texsteam Texheater shown above has a capacity of 2,500,000 B.T.U. per hour and a discharge temperature of 500° F. if required.

A prime requisite for the successful, sustained operation of this unit is, of course, dependable power. A 4-cylinder V-type Wisconsin Heavy-Duty Air-Cooled Engine was specified as original equipment because this engine meets all oil field requirements. Heavy-duty design and construction in all details provides assurance of low cost maintenance, dependable operation and long engine life. Basic High Torque design supplies the load-holding Lugging Power that rides through the shock loads without stalling. Efficient AIR-COOLING at all temperatures from sub-zero to 140° F. eliminates cooling problems and hazards under all weather conditions.

The Wisconsin Engine line includes a complete range of sizes from 3 to 56 hp., in 4-cycle single cylinder, 2- and 4-cylinder models. *All models can be supplied with electric starting.*

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Sohio's McConnell Is Versatile

TWO YEARS ago the API Division of Refining held its midyear meeting in Montreal. The mayor of the French-speaking Quebec metropolis delivered his welcome to the visitors in his native tongue. Both he and his English-speaking guests were somewhat nonplussed when the vice president of the division, Elliott B. McConnell, replied in kind.

The ability of E. B. McConnell to speak French with sufficient fluency to reply to the Montreal mayor's welcome was not surprising to his associates. They are aware of the versatility of the man who heads the manufacturing department of Standard Oil Co. (Ohio). He and his company are in the news today as Sohio prepares to put its new 60,000-bbl. refinery at Toledo on stream. (See p. 95).

It's a unique "process unit" in a number of ways. One of these is its low unit cost. It is more than a "happy accident" in these days of low refinery margins. It was planned that way from the beginning.

As vice president in charge of refining, McConnell had the greatest responsibility and the most to say in the decisions that determine the design of the Toledo refinery. When he speaks, he speaks softly. But, as a close acquaintance pointed out, McConnell means what he says.

Elliott McConnell . . .

. . . has a big year.

Big year . . . The year 1958 is a notable one in McConnell's life.

It witnesses the completion of the biggest single job his department has undertaken, and it also means the thirtieth anniversary of his association with Sohio. He went to work with the company in Cleveland in 1928 as assistant to the vice president in charge of manufacturing.

He was born in Oil City, Pa., and has spent his entire business life in the industry. In 1915, at the age of 14, his family moved to Warren, Pa. He attended high school there and spent 2 years at Kiskiminetas Springs School, a western Pennsylvania preparatory school.

McConnell went to Cornell to study chemical engineering. While there he was editor of a school magazine, was on the track squad, and was a member of Kappa Sigma fraternity. He graduated in 1923 with a bachelor's degree in chemistry.

He got his first taste of oil and gas while he was still in school. He worked during summer vacations in various departments of the Pennsylvania Gas Co. One summer was spent in its meter repair department, two as a ditch digger and helper on a pipeline and repair gang, and two in the engineering department. Another summer was spent as a roustabout and helper on rolls and punches at the Hammond Iron Works.

McConnell's first job after graduation from Cornell was with Standard Oil Co. (N. J.). He began with a 6 months' refinery training course and then got a job in the estimating division of the general engineering department. At the end of another 6 months he became a shift worker in the crude-oil workup laboratory, and then transferred to the cracking coil technical service and development division.

After spending some time running tests on full-scale cracking units, he was made process inspector of tube and tank units. The job involved visiting about 15 refineries twice a year, acting as a clearing house on new developments in the process, and recommending improvements in operation. In 1927 he was sent to Cleveland to help start up two new 750-

Personals

Oscar C. Nonweiler, formerly district superintendent for Cities Service Pipe Line Co., has been appointed manager of Everglades Pipe Line Co. Nonweiler is a former chief engineer for Standard Oil Co. (La.), and also served as chief engineer for the former Oklahoma Pipe Line Co. and general superintendent of the former Ajax Pipe Line Co. He will headquarter in Miami, Fla. **George S. Patterson,** president of Buckeye Pipe Line Co., is president of Everglades Pipe Line. Cities Service Co. and Buckeye are principal owners of Everglades.

Eugene Holman, chairman of the board and chief executive officer of Standard Oil Co. (N. J.), has been elected a director of Chase Manhattan Bank.

Albert W. Sublett, assistant general foreman in the light-oils division finishing department at the Whiting, Ind., refinery of Standard Oil Co. (Ind.), has been appointed assistant supervisor for light-oils planning in the company's Chicago manufacturing department planning division.

C. K. Seaman, Jr., district superintendent with Humble Oil & Refining Co., has been transferred to Hobbs, N. M., from Odessa, Tex.

Donald D. Oathoudt and **Robert J. Flannery** have joined the research staff at the Whiting, Ind., laboratory of Standard Oil Co. (Ind.).

James A. Brown, geologist with General Petroleum Corp., has been transferred to Los Angeles from Denver.

Stanley A. Beck, petroleum engineer with Honolulu Oil Corp., has been transferred to the company's San Francisco head office from Taft, Calif.

Charles F. Passel, Abilene, Tex., division geologist for Ambassador Oil Corp., has been promoted to manager of exploration and assistant to **C. Harrison Cooper,** executive vice president. He will headquarter in Fort Worth.

Merrill E. Shoup, president of Holly Oil Co. and president and a director of several other industrial concerns, has been elected president of Socal Oil & Refining Co. He succeeds the late J. H. Grimes (see deaths). **E. S. Tayloe,** vice president in charge of operations and a director of Socal since 1954, has been elected executive vice president.

psi. cracking coils of Standard of Ohio.

A year later, McConnell accepted the position as assistant to the vice president in charge of manufacturing for Sohio. He held that job until November 1, 1945, when he was made general manager of the manufacturing department. During that period he was issued some 15 patents in the petroleum field. In September 1946, he was appointed vice president in charge of manufacturing and was elected a director.

Activities . . . In addition to serving as the 1956 vice president of the API Division of Refining, McConnell has also been vice chairman of the division's general committee.

He is a member of the American Management Association, trustee and past president of the Cleveland Bureau of Governmental Research, trustee of the Cleveland Council on World Affairs, past member of the board of trustees and vice president of the Ohio Forestry Association, a director of the Western Petroleum Refiners Association, a member of the advisory board of the St. Alexis Hospital, the Cleveland Chamber of Commerce, and the aircraft-fuels committee of the Military Petroleum Advisory Board.

During World War II, he was a member of the technical advisory committee of the Petroleum Industry War Council and was chairman of the codimer subcommittee of the aviation-gasoline committee in PAW. He also spent 5 months in Washington in 1942 as a special technical assistant to the director of the refining division of the PAW on aviation gasoline.

Dr. Philip Lefrancois, research chemist with M. W. Kellogg Co., has been appointed research associate.

R. M. English has been transferred from Billings, Mont., to Durango, Colo., as district exploration manager for Carter Oil Co. English was head of the northern division stratigraphic section in Billings.

Halcombe A. Kendall and **James W. Jennings** have joined Gulf Research & Development Co.'s production engineering division as research engineers. Jennings recently received a master's degree from Colorado School of Mines. Kendall, a graduate of the University of Western Australia, was with Caltex Oil (Australia) Pty., Ltd., before coming to the U.S. He received a master's degree from Texas A&M College last month.

Edward M. Self, geologist with Murphy Corp. in Denver, has resigned to join Caltex Pacific Petroleum Mij. in Sumatra, Indonesia.

Harold Milam, Rocky Mountain division production superintendent in Billings, Mont., for Murphy Corp., will transfer to the company's new Denver district office August 1 when the Billings office will be closed. Also transferring to Denver will be **J. B. Powell,** Montana area geologist; **E. L. Reid,** Wyoming area geologist; and **Meredith Walker,** assistant division landman.

J. Houston Jackson, general manager and a director of BP Tanker Co., has been named managing director. **D. G. L. Bean,** deputy general manager, will succeed Jackson as general manager. **W. D. Brown,** general manager, trade division, for BP Trading, Ltd., has been elected a director of the trading company. He succeeds **Robert Gillespie,** who has retired.

John B. Duckworth, division director of automotive research at the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.), will transfer to Chicago July 1 as research coordinator. **Harold R. Taliaferro,** section leader in the automotive research division, moves up to division director succeeding Duckworth. **Lamont Eltinge,** group leader, becomes section leader replacing Taliaferro. **Theodore O. Wagner** will succeed Eltinge as group leader.

W. F. Brown, assistant Rocky Mountain regional manufacturing manager for Continental Oil Co., moves up to regional manager of manufacturing. He succeeds **J. E. Fenex,** who has retired. Brown joined Conoco in 1943. He was superintendent of the company's Lake Charles, La., refinery before being named assistant Rocky Mountain region manufacturing manager in 1956. Brown will continue to headquarter in Denver.

Gregory K. Elias, exploration manager for Turkish Gulf Oil Co. in Ankara, Turkey, has resigned to open consulting geological offices in Durango, Colo. Elias joined Gulf Oil Corp. in 1949. He was zone geologist in Durango, covering the San Juan, Black Mesa, and Paradox basins, before transferring to Turkish Gulf last year.

Personals

M. H. MITCHELL

Martin H. Mitchell, general manager of Tidewater Oil Co.'s exploration and production operations in Turkey for the past 2 years, has been appointed general manager of operations in Pakistan. He will headquarter in Karachi. Tidewater holds concessions on 10,000 sq. miles in West Pakistan as operator for itself, Skelly Oil Co., Kewanee Oil Co., and the Pakistani Government. Mitchell transferred to San Francisco from Turkey a few months ago as assistant to **J. Earle Gray,** head of foreign exploration and production operations.

W. M. Marrs, geologist with Continental Oil Co., will transfer July 1 to Caracas, Venezuela, from Billings, Mont.

Arthur M. Mouser, division petroleum engineer in Houston for Tidewater Oil Co., has been named assistant manager, gas-utilization department. He will serve both the central and southern divisions from the Houston office. **Albert S. Trube, Jr.,** chief reservoir engineer, becomes division petroleum engineer, succeeding Mouser.

H. A. Lord, superintendent of The Texas Co.'s Lockport, Ill., refinery, has been appointed general manager of the company's engineering department. **R. E. Nagle,** assistant chief engineer, has been named to succeed **H. B. Peters** as chief engineer. Peters retires July 1 after 33 years with Texaco. Lord and Nagle will headquarter in New York.

Dr. Ralph E. Taylor, Humble Oil & Refining Co., has been elected president of the Houston Geological Society. On his cabinet are **James W. Craig,** Lenoir M. Josey, Inc., first vice president; **Edd R. Turner, Jr.,** Tidewater Oil Co., second vice president; **Curtis C. Franks,** Halliburton Oil Well Cementing Co., secretary; and **Austin D. Brixey, Jr.,** Sinclair Oil & Gas Co., treasurer. On the advisory committee are **Albert M. Tolbert,** Union Oil Co.; **J. A. Wheeler,** independent; **Orville G. Lundstrum,** North Central Oil Corp.; **Henry S. McQueen,** Salt Dome Production Co.; and **Aubrey H. Rabensburg** of John W. Mecom, ex officio member.

Personals

Carl A. Houy, independent operator and executive vice president of Bel-air Oil Co., Denver basin independent producer, has been elected vice president in charge of drilling and production and a director of Vista Petroleum Corp., Denver. Houy was chief engineer, manager of drilling operations, and vice president in charge of the gas division for Republic Natural Gas Co. before joining Deep Rock Oil Corp. in 1950. With Deep Rock (now Crescent Corp.), he served as president of a subsidiary, Hugoton Plains Gas & Oil Co. He left Deep Rock in 1955.

W. A. Alexander and **S. E. Giulio** have been appointed research associates in Jersey Production Research Co.'s geophysical research division.

Leonard Acquaviva and **E. Harold Paulu** have been named engineering associates by Esso Research & Engineering Co.

Berry Mullendore Johnson, junior petroleum engineer in Andrews, Tex., for Pan American Petroleum Corp., has been promoted to intermediate petroleum engineer, and transferred to Wink, Tex.

Phil Flanagan, geologist with Carter Oil Co., has been transferred to Riverton, Wyo., from Casper. **Steve Hopkins** transfers from the Billings, Mont., geological staff to Casper. **Fritz Perkins,** geologist in Vernal, Utah, has also been assigned to Casper.

George T. Hansen, Jr., Hyland Oil Co., has been elected president of the Salt Lake City Petroleum Club. Other officers are **T. E. Hobbs,** General Petroleum Corp., first vice president; **R. S. McKnight,** independent, second vice president; **Melvin E. Leslie,** Skyline Oil Co., secretary; and **Robert J. Minton,** English Oil Co., treasurer.

Harry E. Rotert, president of Marquette Petroleum Products, Inc., Chicago, has been named chairman of the board. **Walter J. Ruby** moves up from vice president to president succeeding Rotert. **Robert W. Barnes** becomes first vice president. **Robert Orlanski,** formerly purchasing agent, has been named general manager.

Robert E. Landon, geologist with General Petroleum Corp., has been transferred to Los Angeles from Denver.

John W. Keith, formerly chief chemist in asphalt manufacturing at The Texas Co.'s Port Neches, Tex., refinery, has retired. Keith has been with Texaco for 39 years.

W. C. Wenzel has resigned as executive manager of the Pennsylvania Grade Crude Oil Association. It is understood his duties will be assumed by **J. Paul (Dick) Jones,** who for the past year has served as president of the association.

Ross E. Williams has been named to succeed **A. B. Macaulay** as assistant to Atlantic Refining Co.'s vice president and general manager of domestic and foreign crude oil production. Macaulay was recently named manager of the company's Oklahoma-Kansas producing division. Williams has been chief accountant in the company's southwest accounting section since 1952.

Thomas W. Keating, drilling engineer in Houston for Pan American Petroleum Corp., has taken early retirement and opened consulting engineering offices in Dallas.

Jacob J. Schmidt, who has been in charge of Hope Natural Gas Co.'s exploration and development program in Louisiana, has been elected vice president in charge of gas procurement. Schmidt joined East Ohio Gas Co., affiliate of Hope Natural Gas, in 1924 in Cleveland. He was general production superintendent and assistant to the president of that company before transferring to Hope in 1956. Both companies are part of the Consolidated Natural Gas Co. system.

J. T. Baker and **J. D. Skelton** have been named to head two newly organized sections within Jersey Production Research Co.'s geophysical division. Baker will be in charge of geophysical technical services. Skelton will head geophysical interpretation. The change makes a total of four sections within the geophysical division. **Morris W. Leighton** has been named section head of one of two geological research sections in the geological division.

F. LINDEMAN, JR.

Frank Lindeman, Jr., has resigned as vice president in charge of production for Pan American Petroleum Corp. to open consulting offices in Tulsa. Lindeman joined Pan American in 1933. He has served as assistant division production superintendent in Oklahoma City and Houston, operating superintendent, general superintendent, and manager of producing department for the company. He was elected a Pan Am director in 1952 and became production vice president in 1953.

O. V. Tracy, vice president and a director of Esso Standard Oil Co., and president of Enjay Co., Inc., has been awarded an honorary doctor of science degree by Clarkson College of Technology, Potsdam, N. Y.

G. W. Breuer and **J. H. Robison** have dissolved their partnership, Breuer-Robison Oil Co., Chicago. Breuer is now president of Breuer & Curran Oil Co. Robison is president of Robison Oil Co. Both companies headquarter in Chicago.

Davis W. Reed, Shell Oil Co., division mechanical engineer in Bakersfield, Calif., has been transferred to Ventura, Calif. **Stephen D. G. Wiles,** mechanical engineer in Los Angeles, transfers to Bakersfield to succeed Reed. **Leo W. Abel,** mechanical engineer in Bakersfield, has transferred to Dominguez in the Los Angeles Basin as production foreman. **Robert B. Gaul,** exploration engineer in Bakersfield, becomes mechanical engineer there.

Lewis M. Thompson has been named manager of the production division of Cosden Petroleum Corp. at Big Spring, Tex. He had been manager of the production department since February 1958 and had coordinated drilling, production, and engineering activities of Cosden since 1956. In his new job, Thompson also will be in charge of the geological, geophysical, and leasing activites of the firm. He will work directly with **Marvin H. Miller,** senior vice president and executive charged with supervision of the producing division of the company. Thompson joined Cosden in 1953 as a drilling and production engineer. Before this, he was head of the drilling department of Pan American Production Corp.'s Lubbock, Tex., district.

Personals

James Harrop and **H. H. Meier** have been named assistant managers of Humble Oil & Refining Co.'s Baytown, Tex., refinery. Harrop will be responsible for coordination and blending, technical, employe relations, medical, accounting, and plant protection divisions. Meier is in charge of operating, utilities and oil movements, and mechanical and construction divisions. **H. F. Goss** has been named operations advisor to Harrop and will work on special assignments. **W. B. Franklin** has been appointed head of the new technical division, and **H. F. Hartman** becomes mechanical and construction superintendent.

JAMES HARROP

H. H. MEIER

Colin E. Spearing, formerly general manager of the refineries department of British Petroleum Co., Ltd., and a director of BP Trading Ltd., has been elected a director of Kellogg International Corp. He will headquarter in London.

D. W. Robertson, Don Johnston Drilling Co., has been elected chairman of the Denver chapter of American Association of Oilwell Drilling Contractors. **W. D. Hewit,** Hewit-Gulick Drilling Co., is vice chairman. **Dale McBride,** Camay Drilling Co., will be secretary-treasurer.

Edward J. Barnes, vice president of Macmillan Petroleum Corp., has been elected executive vice president. He succeeds **S. M. Batterson,** who will remain as vice president to advise on financial matters. **H. C. Akerberg,** vice president, and **S. M. Thompson,** secretary-treasurer, have been elected directors. **J. B. Taylor** has been named assistant secretary-treasurer.

Robert H. Vick has resigned as manager of engineering and secondary recovery for Graridge Corp., Breckenridge, Tex., to join the water-flood division of Ambassador Oil Corp., Fort Worth, as assistant superintendent and chief engineer of secondary-recovery operations. Vick, prior to joining Graridge in 1955, was division reservoir and secondary-recovery engineer at Midland, Tex., for Sunray Mid-Continent Oil Co.

E. L. Shadix, tool pusher, has been transferred to Irvine, Ky., from Nowata, Okla., by Overby Drilling Co., Inc.

Ralph G. Sharpless has been named senior engineer in the technical division at Humble Oil & Refining Co.'s Baytown, Tex., refinery.

Donald E. Kudera has joined Texas Illinois Gas Pipeline Co. in Joliet, Ill., as a chemist.

Charles Foust has been promoted to research associate by Esso Research & Engineering Co.

Jim Dowdy, formerly assistant chief development geologist for Seaboard Oil Co., has been transferred from Dallas to Tyler, Tex., in the South Texas division of The Texas Co.

Sir Leonard Sinclair, chairman of Esso Petroleum Co., Ltd., celebrated his 50th anniversary with the British subsidiary of Jersey Standard last week. Sir Leonard joined the old Anglo-American Oil Co. as a junior clerk at Manchester in June, 1908. He was made an Esso director in 1943 and has been chairman of the company since 1951.

Carl M. Hill, vice president in charge of exploration and gas supply; **Louis G. James,** executive vice president of finance and accounting; and **Willard G. Wiegel,** vice president in charge of personnel and company treasurer, have been elected directors of Lone Star Producing Co. Each also is an officer of the parent firm, Lone Star Gas Co.

William A. Hesketh, formerly acting manager of Standard - Vacuum Oil Co.'s Bombay refinery, has been elected president of Standard - Vacuum Refining Corp. (Philippines). Stanvac plans to build a $33.5-million refinery on Bataan Peninsula. Hesketh was operations superintendent at an International Petroleum Co. refinery in Colombia before joining Stanvac in 1954.

Jesse E. McCollum, division petroleum engineer in Houston for Sinclair Oil & Gas Co., has been transferred to Tulsa.

Sir Hartley Shawcross, legal adviser to the Royal-Dutch Shell group, has been elected a director of Shell Petroleum Co., one of the group's two main operating companies.

Jim Barkdull, geologist in Billings, Mont., for Atlantic Refining Co., has been transferred to Casper, Wyo. **Joe Gilig** transfers to Billings from Durango, Colo., to succeed Barkdull.

George W. Horsley, senior vice president and a director of East Ohio Gas Co., has retired. Horsley joined East Ohio in 1915. He has been superintendent of southern divisions, general superintendent, general manager, vice president, and senior vice president of the company.

DEATHS

Paul Burton, 65, Stillwater, Okla., independent operator, died June 14 in Tulsa. Burton underwent surgery for cancer April 7.

William P. Fitzgerald, 47, Carter Oil Co. traffic representative, died June 17 in Tulsa after a heart attack. He had been with Carter since 1928.

J. H. Grimes, president of Socal Oil & Refining Co. since 1943, died June 6 in Long Beach. Grimes was one of the original incorporators of the company in 1933.

R. M. Watson, 49, manager of Phillips Petroleum Co.'s Spokane, Wash., sales division, died June 14 after a boating accident on Lake Coeur d'Alene, Ida. Watson was regional sales manager for Phillips in Bartlesville, Okla., before transferring to Spokane in 1955.

Kirk S. White, 57, Tulsa independent producer and consulting geologist, died June 13 in Tulsa. A graduate of the University of Michigan, White was with Tropical Oil Co. of Colombia and Pacific Petroleum Co., Peru, both subsidiaries of International Petroleum Co., and with the old Dixie Oil Co. in Tulsa before becoming a consultant in 1930. As a producer he was active in Kansas, Oklahoma, and New Mexico.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,316,875	UP	91,125	DOWN	816,079
Crude stocks	263,060,000	DOWN	5,734,000	DOWN	5,391,000
Completions	902	DOWN	4	DOWN	115
Refinery runs	7,659,000	DOWN	31,000	DOWN	68,000
Gasoline stocks	190,241,000	DOWN	2,784,000	DOWN	1,076,000
Kerosine stocks	22,959,000	UP	615,000	DOWN	3,828,000
Distillate stocks	96,694,000	UP	3,657,000	DOWN	9,477,000
Residual stocks	63,393,000	UP	583,000	UP	19,523,000
Four-product stocks	373,287,000	UP	2,071,000	UP	5,142,000
Total imports	1,504,200	UP	41,500	DOWN	222,000

Low Refinery Runs in Third Quarter

. . . Give Better Supply-Demand Balance

BY JOHN C. CASPER

Economics Editor

REFINERY RUNS in the first week of June were high enough to cover product demands and additions to storage in the third quarter. Runs averaged 7,690,000 bbl. daily for the week ended June 6. This rate, combined with product imports and production of natural-gas liquids, would cover total demand of 8,700,000 bbl. daily and leave a little over 30,000,000 bbl. for additions to stocks.

Runs averaged 7,995,000 bbl. daily in the third quarter last year, and 8,011,000 bbl. daily the year before. Fourth-quarter events proved both rates to be too high. In the fall of 1956, product stocks reached 532,000,000 bbl. by the end of October. Refinery runs had to be cut 85,000 bbl. daily in the fourth quarter despite additional demand due to the closing of Suez.

Runs averaged 7,855,000 bbl. daily in the third quarter last year. This rate supplied enough products to meet demand and have 60,000,000 bbl. left over to add to storage. Fourth-quarter demand was poor and refinery runs had to be cut 200,000 bbl. daily. February was the only good month in the first quarter of 1958, and stocks at the end of the year were so high that runs had to be cut another 200,000 bbl. daily for the quarter.

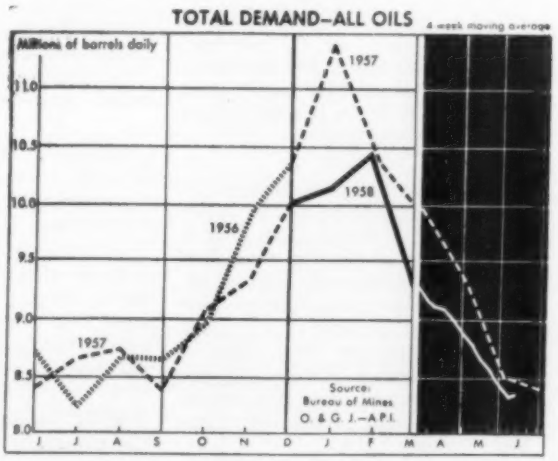
Refiners and producers have the excess capacity to cover a much larger part of winter demand out of current operations than they actually supplied last winter. They had too much crude and products in tanks and had to cut operations until part of the surplus was used up.

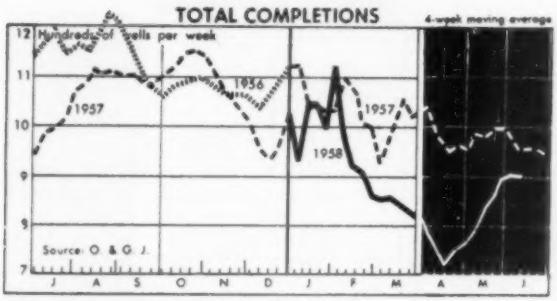
Refiners have enough capacity to average 8,300,000 bbl. daily. That rate would cover expected requirements in the fourth quarter. Demand in the first quarter of next year can be met from the same refining rate plus 350,000 bbl. daily from product stocks. Surplus stocks on hand at midyear would help cover high demands due to colder-than-normal weather next winter.

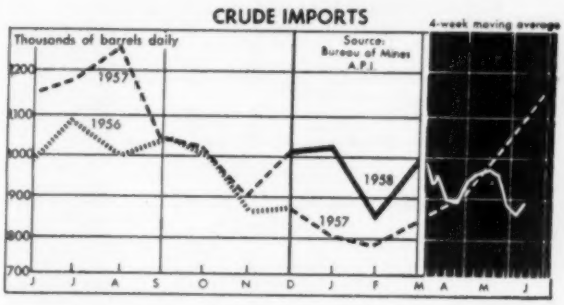
PETROLEUM SUPPLY AND DEMAND—THIRD QUARTER

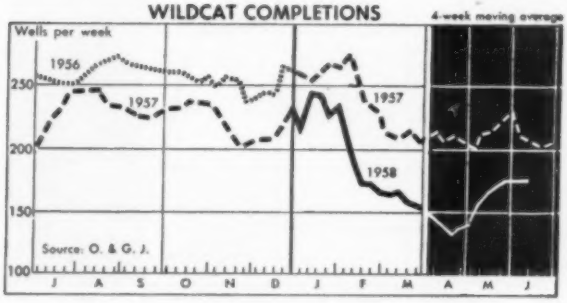
(Thousands of barrels daily)

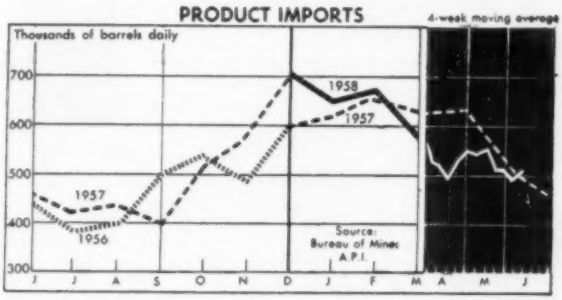
	1958	1957	1956
Total demand	8,700	8,620	8,545
Domestic	8,400	8,242	8,176
Export	300	378	369
Stock change	400	615	809
Crude	70	—42	46
Products	330	657	763
Total new supply	9,100	9,235	9,354
Total production	7,750	7,612	7,898
Crude	6,950	6,841	7,113
Gas liquids	800	771	785
Total imports	1,350	1,623	1,456
Crude	900	1,198	1,042
Products	450	425	414
Refinery runs	7,690	7,955	8,011







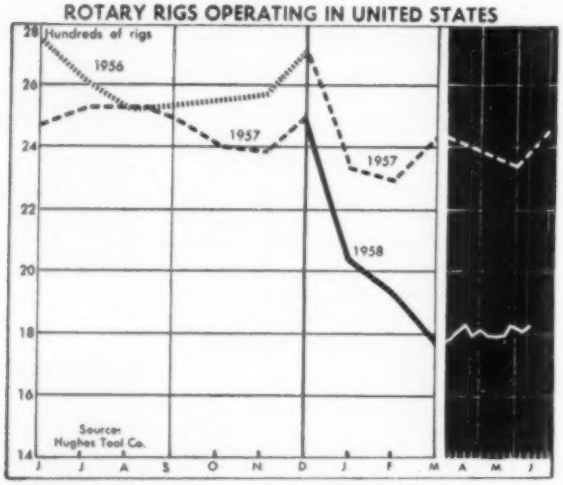




WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 14, 1958

	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	2	1	0	0	1	0	13,070	37	54	1	0	0	0	1	14	20
Arkansas	7	1	0	0	6	0	19,427	287	440	3	0	0	0	3	73	74
California	21	15	0	1	5	0	98,387	793	1,005	5	2	0	0	3	164	245
Colorado	14	3	0	0	11	0	76,667	329	387	9	0	0	0	9	177	259
Illinois	36	13	0	1	22	0	97,766	854	1,096	8	0	0	0	8	179	272
Indiana	15	4	0	1	10	0	26,816	297	288	8	1	0	1	6	115	58
Kansas	69	31	0	4	31	3	236,303	1,623	1,878	13	2	0	1	10	329	368
Kentucky	29	11	0	1	17	0	44,206	417	615	2	0	0	0	2	47	115
Louisiana	62	29	4	3	26	0	536,459	1,487	1,699	7	0	0	0	7	216	304
North	20	11	0	2	7	0	74,572	500	562	0	0	0	0	0	76	70
South	36	13	4	1	18	0	408,906	784	809	7	0	0	0	7	125	193
Offshore	6	5	0	0	1	0	52,981	203	328	0	0	0	0	0	15	41
Michigan	8	2	0	0	6	0	28,300	172	178	4	0	0	0	4	57	73
Mississippi	10	6	1	0	3	0	87,278	169	163	3	0	0	0	3	86	82
Montana	9	3	0	0	6	0	45,230	163	152	5	0	0	0	5	70	53
Nebraska	19	7	0	0	12	0	115,450	299	359	8	0	0	0	8	142	202
New Mexico	36	16	1	14	5	0	186,834	847	917	5	0	0	0	5	114	130
West	20	4	0	14	2	0	92,533	395	343	2	0	0	0	2	50	48
East	16	12	1	0	3	0	94,301	452	574	3	0	0	0	3	64	82
New York	10	5	0	0	0	5	13,500	249	213	0	0	0	0	0	16	1
North Dakota	12	9	0	0	3	0	95,306	195	130	3	1	0	0	2	64	52
Ohio	22	9	0	3	7	3	39,790	464	466	0	0	0	0	0	5	3
Oklahoma	119	65	0	3	51	0	344,362	2,970	2,865	20	3	0	0	17	403	327
Pennsylvania	0	0	0	0	0	0	0	184	354	0	0	0	0	0	6	35
Texas	333	159	11	14	143	6	1,346,269	8,142	9,918	70	7	0	0	63	1,677	2,525
Dist. 1	18	9	0	1	8	0	45,252	457	568	6	0	0	0	6	184	191
Dist. 2	22	7	3	2	10	0	114,098	345	331	4	0	0	0	4	90	134
Dist. 3	30	12	2	1	15	0	195,406	595	824	6	0	0	0	6	121	252
Dist. 4	41	13	2	7	19	0	182,338	557	659	8	1	0	0	7	164	240
East	17	5	0	0	12	0	82,646	551	566	8	0	0	0	8	159	171
Dist. 7-B	41	12	0	0	27	2	111,923	1,053	1,303	11	2	0	0	9	297	489
West	79	52	2	0	23	2	371,857	2,401	2,831	18	4	0	0	14	338	426
Dist. 9	65	37	0	1	25	2	158,379	1,623	2,220	7	0	0	0	7	276	579
Dist. 10	20	12	2	2	4	0	84,370	560	616	2	0	0	0	2	48	43
Utah	4	3	0	0	1	0	19,792	194	75	0	0	0	0	0	35	44
West Virginia	16	3	0	10	1	2	45,322	306	280	1	0	0	0	1	10	12
Wyoming	9	4	0	0	5	0	57,344	322	366	4	1	0	0	3	93	120
Miscellaneous	1	0	0	0	1	0	1,211	41	32	1	0	0	0	1	35	25
Total U. S.	**863**	399	17	55	373	19	3,575,089	20,841	23,930	**180**	17	0	2	161	4,127	5,399
Total prev. week	879	447	18	62	323	29	3,536,991			178	19	4	4	51		
Cum. 1958	20,841	10,333	517	1,542	7,958	491	88,083,481			4,127	390	69	127	3,541		
Western Canada	47	23	0	7	17	0	223,949	1,028	1,202	9	0	0	1	8	356	322

ROTARY RIGS OPERATING IN UNITED STATES



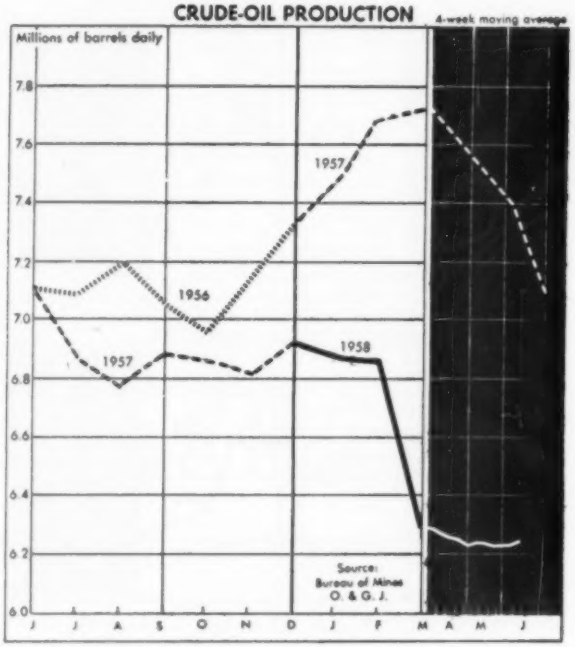
ACTIVE ROTARY RIGS*

	6-16-58	6-9-58	6-2-58	6-17-57
Alabama	5	5	5	11
Arkansas	19	24	24	20
Arizona				
California	77	78	81	105
Colorado	45	36	33	43
Florida	1	1	1	1
Georgia	1	1	1	
Idaho				
Illinois	71	52	54	52
Indiana	11	10	7	3
Iowa	3	3	3	2
Kansas	128	141	134	161
Kentucky	10	12	9	9
Louisiana	276	270	279	436
North	39	35	39	55
South	198	193	197	280
Offshore	39	42	43	101
Maryland				
Michigan	6	5	9	12
Missouri				1
Montana	17	15	19	25
Mississippi	39	39	39	39
Nebraska	25	24	28	40
Nevada				
New Mexico	129	123	129	152
New York	2	2	2	
North Dakota	35	34	37	24
Ohio				1
Oklahoma	179	173	176	227
Oregon	1	1	1	1
Pennsylvania	9	10	10	15
South Dakota				
Texas	639	643	642	982
Gulf Coast	122	126	121	193
Offshore	3	3	3	6
West	251	250	258	391
North	225	220	215	326
East	38	44	45	66
Tennessee				
Utah	37	36	36	45
Washington				
West Virginia	8	8	5	3
Wyoming	61	57	58	73
Virginia				
Total United States	1,834	1,803	1,822	2,483
Western Canada	164	155	160	215
Eastern Canada	3	3	1	1
Grand total	2,001	1,961	1,983	2,699

*Hughes Tool Co.

CRUDE-OIL PRODUCTION

4-week moving average

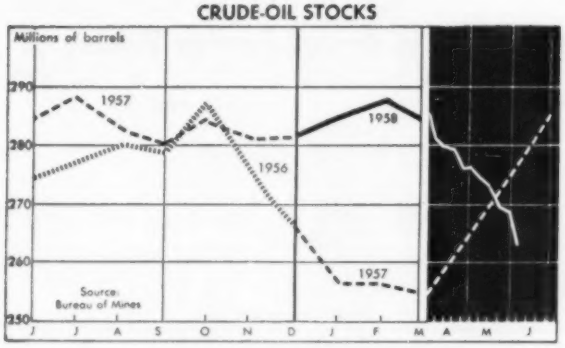


DAILY AVERAGE PRODUCTION FOR WEEK

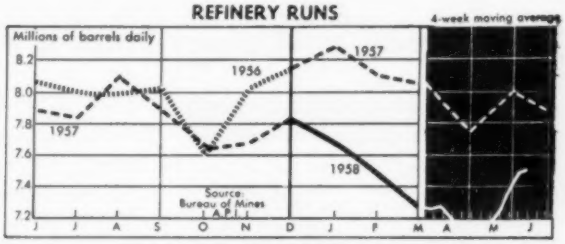
	June 14, 1958			June 7
	Crude oil	Lease condensate	Total	total
Alabama	15,000		15,000	14,925
Arkansas	75,900	200	76,100	75,700
California	849,200		849,200	850,300
Colorado	133,025		133,025	135,200
Eastern	50,700		50,700	49,800
Florida	1,275		1,275	1,275
Illinois	229,300		229,300	215,600
Indiana	31,800		31,800	30,700
Kansas	†339,650		†339,650	†293,600
Kentucky	44,000		44,000	41,900
Louisiana	729,000	86,775	815,775	815,475
North	111,000	3,000	114,000	113,700
South	618,000	83,775	701,775	701,775
Michigan	26,300		26,300	26,000
Mississippi	93,200	4,500	97,700	97,700
Montana	74,700		74,700	73,750
Nebraska	52,250		52,250	52,625
Nevada	100		100	100
New Mexico	248,800	5,700	254,500	254,000
North Dakota	35,200		35,200	36,250
Oklahoma	†540,900		†540,900	†524,700
Texas	2,205,000	65,000	2,270,000	2,270,000
Dist. 1	45,500	400	45,900	45,900
Dist. 2	90,000	8,600	98,600	98,600
Dist. 3	315,000	32,000	347,000	347,000
Dist. 4	163,000	8,200	171,200	171,200
Dist. 5	25,500	300	25,800	25,800
Dist. 6	92,000	7,000	99,000	99,000
East Texas field	120,000		120,000	120,000
Dist. 7-B	122,000	100	122,100	122,100
Dist. 7-C	117,000	4,050	121,050	121,050
Dist. 8	817,000	1,900	818,900	818,900
Dist. 9	192,000	1,800	193,800	193,800
Dist. 10	106,000	650	106,650	106,650
Utah	76,400		76,400	70,500
Wyoming	302,850		302,850	295,500
Others	‡150		‡150	‡150
Total U. S.	6,154,700	162,175	**6,316,875**	6,225,750
Change from previous week, up			**91,125**	
Canada	†399,200		†399,200	†372,600
Total U. S. production, January 1-June 14			1,066,916,550 bbl.	
Same period last year (crude plus cond.)			1,243,387,285 bbl.	

*Includes 23,430,125 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

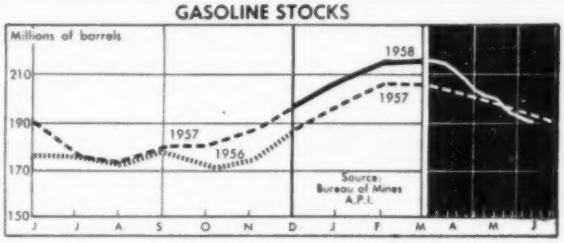
CRUDE-OIL STOCKS



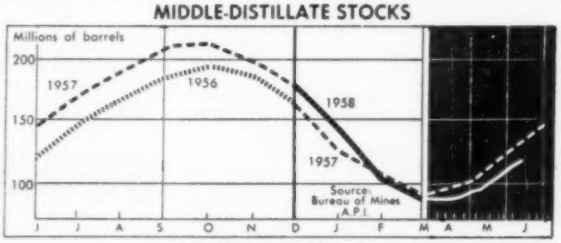
REFINERY RUNS



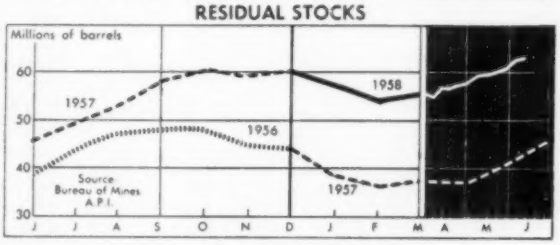
GASOLINE STOCKS



MIDDLE-DISTILLATE STOCKS



RESIDUAL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	6-7-58	5-31-58	6-8-57
Pennsylvania Grade	2,878	2,932	2,673
Other Appalachian	1,465	1,461	1,898
Illinois, Indiana, and Michigan	11,344	10,968	9,622
Nebraska and North Dakota	2,150	2,254	2,082
Kansas	10,085	10,467	10,863
Oklahoma	16,881	17,148	21,292
Arkansas	2,215	2,357	2,932
Louisiana	16,482	17,081	18,396
North	2,891	3,000	2,846
South	13,591	14,081	15,550
Mississippi, Alabama, Florida	2,066	2,139	2,614
New Mexico	7,646	7,754	8,166
Texas	111,039	115,349	124,295
East Texas	7,241	7,519	11,548
West Texas	53,093	55,192	59,199
Texas Gulf	21,849	22,134	23,584
Other Texas	28,856	30,504	29,964
Wyoming	15,557	14,617	16,484
Other Rocky Mountain	7,817	8,080	5,787
California	38,819	39,594	26,994
Foreign	†16,616	16,593	14,353
Total	263,060	268,794	268,451

*Bureau of Mines. †Includes 4,722,000 bbl. in California.

API REFINERY REPORT—JUNE 13, 1958

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, June 1957—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist	Resid.
East Coast	1,105	461.6	26.0	276.8	175.4	44,509	8,814	30,021	13,023	1,210	498.0	21.3	300.8	223.2
Appalachian:														
District 1	94	46.7	2.9	18.6	3.1	4,797	563	2,105	587	101	44.7	3.2	20.7	4.6
District 2	107	58.4	7.1	13.6	6.1	2,495	401	982	333	58	34.2	3.6	7.6	7.3
Ind., Ill., Ky.	1,428	717.1	61.7	293.8	146.7	35,550	4,772	16,058	5,349	1,340	684.7	57.1	263.7	157.0
Minn., Wis., Dak.	106	50.2	4.0	28.7	10.1	6,945	1,028	4,975	521	99	47.7	6.9	26.4	8.1
Okla., Kans., Mo.	736	403.4	16.1	161.9	23.4	16,701	1,263	8,679	877	719	402.4	12.9	168.7	28.6
Inland Texas	271	199.7	5.6	44.4	15.9	6,148	346	1,521	2,049	275	204.8	9.4	51.5	21.9
Texas Gulf Coast	1,726	885.0	74.1	400.3	192.3	24,913	2,693	10,298	5,568	1,869	932.6	72.8	491.1	277.8
La. Gulf Coast	639	400.4	51.2	163.9	47.1	9,764	1,645	4,652	1,476	653	369.5	53.7	172.7	51.5
N. La. and Ark.	94	34.6	4.3	19.4	7.3	4,407	832	2,064	151	93	33.7	5.2	21.4	6.8
Rocky Mountain:														
New Mexico	20	8.4	1.1	4.3	2.9	651	19	145	66	27	13.4	.3	5.5	2.8
Other Rocky Mt.	290	130.6	3.0	63.4	31.3	6,627	204	2,658	962	292	137.4	2.2	65.6	32.8
West Coast	1,043	455.3	9.6	169.9	261.1	26,734	379	12,536	32,431	1,131	478.1	5.3	177.0	328.7
June 13, 1958	7,659	3,851.4	266.7	1,659.0	922.7	190,241	22,959	96,694	63,393	7,867	3,881.2	253.9	1,772.7	1,101.1
June 6, 1958	7,690	3,880.7	246.4	1,750.1	967.9	193,205	22,344	93,037	62,810	.....	.....	.....	.....	.....
June 14, 1957	7,727	3,893.4	246.0	1,692.3	1,092.1	191,317	26,787	106,171	43,870	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

Regular (89 octane)	11.75-12.00
Premium (99 octane)	14.75-15.00

Gulf Coast (cargoes for coastwise or export movements):

Regular (90 octane)	9.75-10.25
Regular (92 octane)	10.00-10.50
Premium (97 octane)	11.375-11.75
Premium (98 octane)	11.875-12.50

California (rack) (Los Angeles):

★ Regular (88 octane)	11.3-11.5
★ Premium (96 octane)	12.8-13.0
★ Premium (98 octane)	13.3-13.5

Caribbean area (cargoes):

Regular (87 octane)	9.625
Premium (98 octane)	12.125

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:

Grade 26-70	4.5

Breckenridge:

Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

Kerosine 42-44	9.25-9.50
Diesel oil (58 d.i. and above)	8.875-9.125
Distillate No. 1	8.875-9.125
Distillate No. 2	8.25-8.50

Gulf Coast (cargoes):

Kerosine 41-43	8.50-8.75
★ Distillate No. 2	8.125-8.25

New York Harbor (barges):

Kerosine 41-43	9.35
Distillate No. 2	8.85
Diesel fuel, 48-52 d.i.	9.45

Caribbean area (cargoes):

Distillate No. 2	8.125

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank cars	6.50

New York (export):

126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max 1% S)	$1.25-1.30
Gulf Coast (cargoes):	
Bunker C fuel	$2.20-2.25
New York Harbor (barges):	
Bunker C fuel	$2.57
Caribbean (cargoes):	
Bunker C	$2.25
California (rack):	
Bunker C fuel, Los Angeles	$2.45

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	24
200 vis. neutral (180° at 100°), 25 p.t.	22

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.§	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.47	....	....	....	....
15-15.9	2.52	....	....	....	$1.81
16-16.9	2.58	....	....	....	1.86
17-17.9	2.63	....	....	....	1.91
18-18.9	2.69	....	....	....	1.96
19-19.9	2.74	....	....	....	2.01
20-20.9	2.80	$2.75	....	$2.62	2.06
21-21.9	2.85	2.77	....	2.64	2.11
22-22.9	2.91	2.79	....	2.66	2.16
23-23.9	2.96	2.81	$3.44	2.68	2.21
24-24.9	3.02	2.83	3.46	2.70	2.26
25-25.9	3.07	2.85	3.48	2.72	2.31
26-26.9	3.13	2.87	3.50	2.74	2.36
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma (sweet), part of Kansas, North Dakota, W. Texas (sweet). Some Oklahoma available for 15 cents less starting 3-17-58 and other at 10 cents less on 4-1-58. †Low cold test crude. ‡Sour. §Some crude 10-25 cents lower.

Effective dates of broad changes: California, 4-14-58; east of California, January 3-10, 1957; Pennsylvania Grade 6-18-58.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
★ Bradford	3.90
★ Middle District	3.72
★ Southwest Pennsylvania	3.43
★ West Virginia	3.25
★ Buckeye Grade	3.25
Illinois Basin	3.00
Canada:	
Leduc-Woodbend	2.67
Redwater (Alta.)	2.56
Smiley (Sask.)	2.33
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26°-26.9°, Amuay*	2.55
Quiriquire, 16.0°-16.4°, Caripito	2.30
Lagunillas heavy, flat, Amuay or Las Piedras*	2.25
Bachaquero, flat, 15°-16°, Las Piedras*	2.08

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Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.49
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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Salt Lake City, Utah. Notice is hereby given that 640 acres of land in three parcels, Parcel 1: SE¼ NE¼, E½ SE¼ Sec. 14, 120 acres; Parcel 2: E½ NE¼ Sec. 23, S½ NW¼, SW¼ NE¼ Sec. 24, 200 acres; Parcel 3: E½ SE¼ Sec. 23, SW¼, NW¼ SE¼ Sec. 24, 280 acres, all in T. 15 S., R. 11 E., SL Mer., Utah, within the known geologic structure of the Farnham Dome Field, Utah, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 P.M., M.S.T., July 31, 1958, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Salt Lake City, Utah, office.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Santa Fe, New Mexico. Notice is hereby given that approximately 4,369.68 acres of land in eighteen parcels within the known geologic structure of certain fields in Eddy, Lea, Rio Arriba and San Juan Counties, New Mexico will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 2:00 p.m., MST, July 15, 1958, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Land Office at Santa Fe, New Mexico. Douglas E. Henriques, Manager.

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Oil Spending Drops

well below earlier estimate. Decline may continue too.

THE OIL industry will spend less for new plant and equipment in 1958 than in either of the two preceding years.

In the past 3 months the industry has slashed its expansion program by close to $270 million, the government's quarterly report shows.

Total spending for this year now is estimated at $2,837 million, down $617 million from last year. Three months ago the estimate for the year was $3,106 million.

Actual spending in the first quarter was $587 million. In March the estimate for the quarter was $744 million, and last December it was $775 million.

For the current quarter, the total now is estimated at $746 million against $784 million anticipated 3 months ago for the quarter.

For the third quarter, only $721 million now is expected to be spent for expansion. But government economists would not be surprised if this figure, too, were pared down. They expect the decline to extend also through the fourth quarter, and it may carry over into next year.

The $617 million drop in 1958 oil expansions, as compared with last year, is part of a decline of more than $6 billion in industrial expansion generally. Only the public utilities will spend more for new plant and equipment this year.

Court Studies Railroad Case

THE COLORADO Supreme Court has under advisement an appeal from a state District Court decision favoring the Union Pacific Railroad in a minerals-right case.

Appellants are two Logan County landowners, Sara M. Radke and Edward K. Farr. They are contesting the railroad's claim to oil and gas rights on 160 acres of farm land 5 miles northeast of Crook, Colo.

Judge George Blickhahn ruled in December 1956 in District Court at Sterling, Colo., that Union Pacific acted within its rights when it reserved all oil and gas rights on land-grant properties sold to finance westward construction of the line a half-century ago.

UP claims rights to "coal and other minerals" underlying about 16 million acres of such rights-of-way in Colorado, Wyoming, Nebraska, and Utah.

The Supreme Court did not indicate when its ruling would be made.

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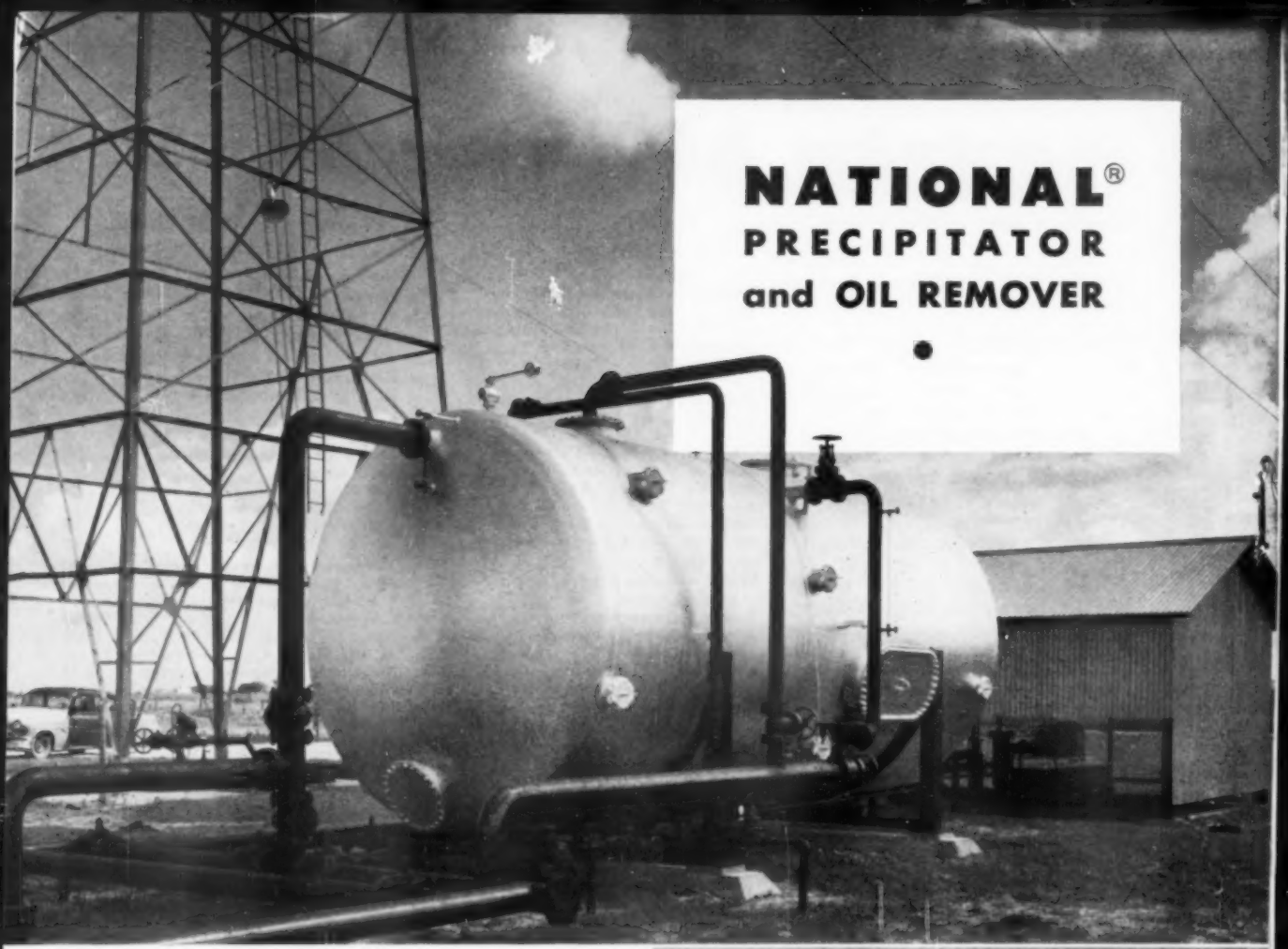

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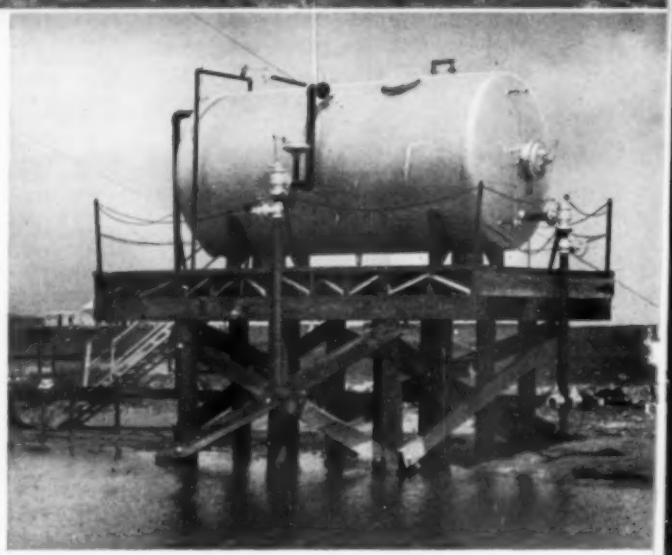

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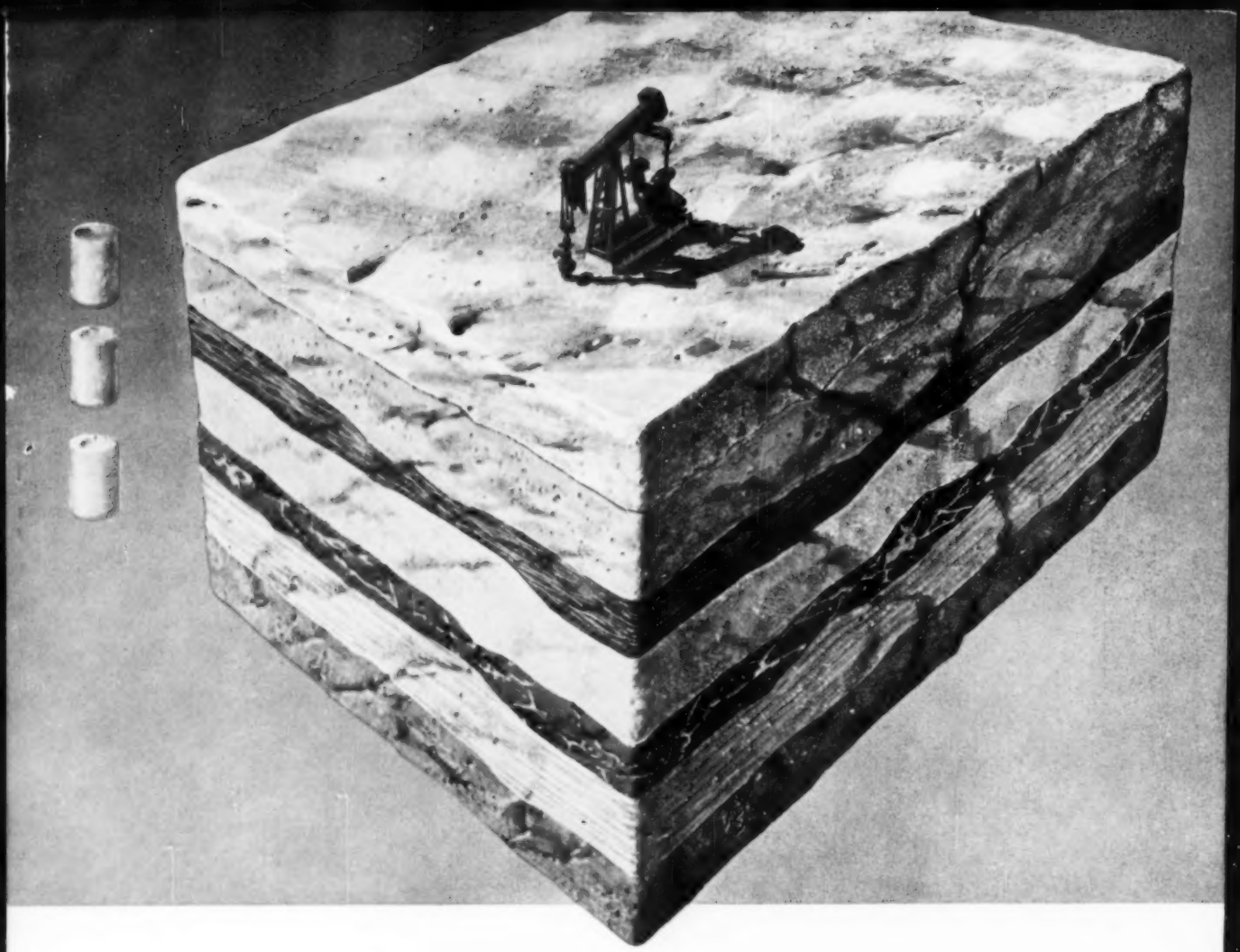

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